GKS B-52H MSFS2020 / 2024

Normal Procedures section II

NOTE

- This section contains text and an amplified checklist. The text is divided into primary paragraphs which form the phases of a normal flight. Most of these paragraphs are followed by an amplified checklist for the particular phase of the flight. The amplified checklist is presented in a chronological form that will enable the flightcrew to complete their inspection, checks, and operation of the aircraft in an expedient yet thorough manner. The amplified checklist describes in detail the steps to be completed. Each major part has been assigned to one of the pilots or a crewmember to be read by him, and to be accomplished by others in the crew. However, there are exceptions as some of the checklists will be read and completed silently. To show which crewmember will accomplish certain steps, the normal crew coding will be used and the code letters will appear after the response to each step. At times it may be advantageous for the copilot to accomplish certain items designated for the pilot and vice versa. The terms “as required,” “as desired,” “climatic,” and “cross-checked” as used in the checklist indicate equipment operation or settings which may vary according to prevailing conditions. In practice, the response to these items will be the required switch or control position or actual indicator reading. The amplified checklist has also been designed to accommodate the production of the abbreviated checklist to be used during aircraft operation.

- Some system control switches are provided with a guard, such as stabilizer trim cutout, antiskid, etc. In practice, when these switches are actuated, the desired toggle position will be ascertained and then the guard positioned.

- The thruflight checklist is integrated into the INTERIOR INSPECTION checklist and BEFORE STARTING ENGINES checklist.

Table of Contents

PREPARATION FOR FLIGHT

FLIGHT RESTRICTIONS

All limitations imposed on the aircraft are described in Section V, OPERATING LIMITATIONS.

AUTHORIZED SPEEDS BELOW 10,000 FEET MSL (Outside Special Use Airspace)

If FAA and/or Host Nation rules require flight at safe maneuvering airspeeds below 10,000 feet MSL (Outside Special Use Airspace), use the following:

1. Formation rejoins on departure, 280-320 KIAS.
2. Descents into a Military Training Route (MTR), 200-300 KIAS (remain below 250 KIAS unless safety of flight or tests require higher airspeeds). Accelerate to airspeeds authorized in FLIP when the aircraft is established in the confines of the MTR.
3. If a route abort or unplanned climb causes the aircraft to exit the MTR, slow to a safe maneuvering airspeed (200-250 KIAS) after terrain/obstacle clearance is assured. Upon clearance to climb, resume normal climb speeds not to exceed 320 KIAS.

FLIGHT PLANNING

The necessary fuel, airspeed, and performance data required to complete a proposed mission should be determined by using the operating data lists. This data should be rechecked to determine the effect of any changes in runway conditions or aircraft configuration.

FUEL SERVICING

Dipsticks have been provided for use by the servicing crew. In order that the pilot may check the fuel loading, a refueling and distribution log will be with the aircraft Form 781 and will be checked and signed by the pilot during the INTERIOR INSPECTION.

TAKEOFF AND LANDING DATA CARDS

Compute all takeoff and landing data and complete the takeoff and landing data cards. This data should be rechecked to determine the effect of any changes in runway conditions or aircraft configuration.

WEIGHT AND BALANCE

Obtain and check the takeoff and anticipated landing gross weight and balance before flight. Check that the required fuel and ordinance have been loaded. Do not attempt takeoff or landing with cg outside the specified limits.

CHECKLISTS

The flight manual checklists have been designed so that they may be used for training missions with or without weapons, for combat missions, for alert posture, and for SIOP missions which are launched from other than a ground alert posture. Ground alert checklist implementation and instructions are contained in ALERT PROCEDURES, this section.

NOTE

- For specific guidance concerning accomplishment of weapons preflight, see ALERT PROCEDURES, this section.
- When no bombs or missiles are loaded, safety wires and seals are not required on the associated monitor control and release system controls.

PREPARATION FOR FLIGHT CHECKLIST

NOTE

The following items should be checked by the pilot prior to flight.

1. Flight Crew Information File – Checked (P)
2. Takeoff & Landing Data & Fuel Prediction Curve – Completed (CP)
3. Pilots' Route Map – Completed as required (P-CP)
4. Takeoff Abort & Touch-And-Go Procedures – Reviewed (P-CP)
5. Crew Briefing – Completed (P)
   a. Announce assembly time.
   b. Brief all crewmembers on crew report procedures.
   c. Station Checks

      Pilot and copilot accomplish station checks at level-off, at approximately 30-minute intervals during cruise, and prior to leaving crew positions during flight. A check for system operation and proper switch settings for prevailing conditions will be made during each station check.

      Station Checks Will Include:

      (1) Circuit Breakers

      (2) Generators

      (3) Fuel Panel

      (4) Engine Instruments

      (5) Oxygen Quantity

      (6) Hydraulic Systems

      (7) Anti-Icing Systems

      (8) Update AHRS

      (9) CG/FLAS

PREFLIGHT CHECK

BEFORE EXTERIOR INSPECTION CHECKLIST

1. Aircraft Readiness Form Reviewed (P)

2. Ground Crew – Briefed (P)

   a. Stabilizer Trim Check.

      Brief the ground crewmember that he will report the movement of the leading edge of the stabilizer and when the stabilizer reaches 0° position during the trim check.

   b. Alarm System Check.

      Brief the ground crewmember that he will check the alarm system in the bomb bay during the crew report and report condition to the pilot.

   c. External Starting Air Check.

      Brief the ground crewmember to give actual psi on external starting air.

   d. Ground Emergency Procedures.

      Brief the ground crewmember on procedures to be followed in the event of an engine fire or other emergency. Emphasize crew egress in the event of a spreading engine fire or of fire burning into the wing.

   e. Taxi-Out Procedures.

      Brief the ground crewmember on the direction of taxi out, and sequence in relation to other aircraft.

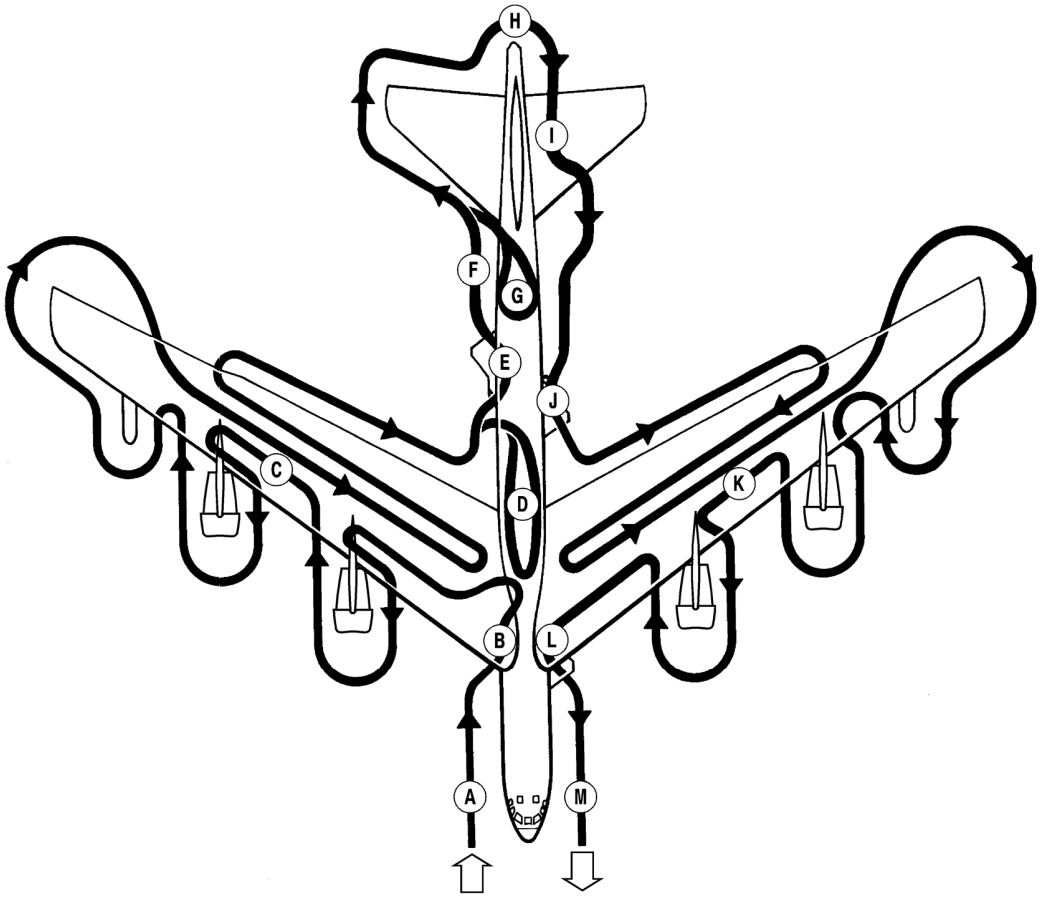
   f. Connect External Power for Lighting (as required).

      Exterior and interior lights may be utilized at the discretion of the pilot to assist in loading equipment and in the interior preflight. Brief the ground crewmember to connect external power to aircraft

EXTERIOR INSPECTION CHECKLIST

The exterior inspection is designed to be accomplished normally by an experienced pilot and copilot, each inspecting one side of the aircraft simultaneously, one pilot starting with nose section (right) through empennage and the other pilot starting with the left aft wheel well through the nose section (left). However, in the event only one pilot is available, he can perform the complete inspection. The following inspection is based on the assumption that appropriate maintenance personnel are not available to perform this preflight and that the flightcrew is accomplishing the preflight with emphasis on the items that affect the safety of flight. See figure 2-19 for a diagram of the route to be followed during the exterior inspection.

Exterior Inspection Diagram



- A RIGHT NOSE SECTION
- B RIGHT FORWARD WHEEL WELL
- C RIGHT WING
- D BOMB BAY
- E RIGHT AFT WHEEL WELL
- F RIGHT AFT FUSELAGE
- G AFT EQUIPMENT COMPARTMENT
- H EMPENNAGE
- I LEFT AFT FUSELAGE
- J LEFT AFT WHEEL WELL
- K LEFT WING
- L LEFT FORWARD WHEEL WELL
- M LEFT NOSE SECTION

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Figure 2-19

(A) Right Nose Section

1. Pitot Tube Covers – Removed and clear
2. EVS FLIR Turret – Free and unobstructed
3. TACAN Antenna – Checked Check for cleanliness and security
4. Escape Hatch – Secure
5. Static Ports & Drain Plugs – Checked

Check static ports clear and drain plugs installed. (Static ports are located high on the right side of the fuselage.)

6. Air Ducts & Vents – Clear
7. Single Point Refuel Cap – Secure

(B) Right Forward Wheel Well

1. Landing Lights – Checked

Check the right landing, terrain clearance, crosswind, and taxi lights for cleanliness and security and glass and filament intact.

2. Wheel Chocks – In place
3. Tires & Hydraulic Lines – Checked

Ascertain tires have been inflated to proper pressure for present gross weight. Check tires for cuts, blisters, and worn spots and hydraulic lines for security and leaks.

4. Safety Switch Linkage, Torsion Link & Oleo Extension – Checked

Oleo safety switch linkage connected and secure. Torsion link connected and pin in place and safetied. Oleo strut for cleanliness, hydraulic leaks, and proper inflation.

5. Landing Gear Ground Lock – Installed
6. Battery Cover – Secure
7. Leaks & General Condition – Checked

Check entire wheel well area for foreign objects, hydraulic or fuel leaks, and security of all equipment.

8. Doppler Radome – Checked

Check for security, cracks, buckling, and cleanliness.

(C) Right Wing

1. Access Panels, Vents & Drains – Checked

Check access panels fastened and secure, drains clear and unobstructed, and no leaks.

2. No. 3 Strut for Condition – Checked

Check strut for cracks, buckling, and loose rivets.

3. Engines 5 & 6 Aft Section – Checked

Engine exhaust plugs removed. Ensure tailpipes free of foreign matter and turbine buckets not nicked or missing.

4. Nacelle Cowlings – Checked

Check nacelle cowlings for cracks and security.

5. Constant Speed Drive Oil Cooler & Generator Cooling Air Exhausts – Checked

Check the generator cooling air and constant speed drive oil cooler exhausts on the left engine unobstructed.

6. Nose Sections 5 & 6 – Checked

Engine intake plugs removed. Ensure intakes free of foreign matter. Check for nicked compressor blades.

7. Access Panels – Checked

Check access panels fastened and secure.

8. No. 4 Strut for Condition – Checked

Check strut for cracks, buckling, and loose rivets.

9. Engines 7 & 8 Aft Section – Checked

Engine exhaust plugs removed. Ensure tailpipes free of foreign matter and turbine buckets not nicked or missing.

10. Nacelle Cowlings – Checked

Check nacelle cowlings for cracks and security.

11. Constant Speed Drive Oil Cooler & Generator Cooling Air Exhausts – Checked

Check the generator cooling air and constant speed drive oil cooler exhausts on the left engine unobstructed.

12. Nose Sections 7 & 8 – Checked

Engine intake plugs removed. Check for nicked compressor blades.

13. Taxi Light – Checked

Check for cleanliness and security and glass intact.

14. Access Panels – Checked

Check access panels fastened and secure.

15. Tip Gear Door & Well – Checked

Check hydraulic lines and actuators secure, no leaks, and wiring and other equipment secure.

16. Tip Gear Ground Lock – Installed
17. Oleo Strut, Wheel & Tire – Checked

Check oleo strut for cleanliness, hydraulic leaks, and proper inflation. Inspect wheel for cracks and tires for cuts, blisters, worn spots, and slippage.

18. External Tank – Checked

Check access door and filler neck cap secure and vent unobstructed.

19. Access Panels & Surge Tank Vent – Checked

Check access panels secure and surge tank vent clear of obstructions.

20. Wing Tip & Upper Surface – Checked

Check wing tip antennas for cracks and dents. Check upper wing surface for frost, snow, ice, or dust and security of access openings and fuel caps.

21. Outboard Wing Trailing Edge – Checked

Check skin for cracks, buckling, and loose rivets.

22. Fuselage Tanks Filler Caps – Secure

23. Outboard Wing Flap Well – Checked

Check hydraulic lines for leaks and security of wiring.

24. Inboard Wing Flap Well – Checked

Check hydraulic lines for leaks and security of wiring, control cables, and circuit breakers set.

25. Lower Surface of Wing Flaps – Checked

Check lower surfaces for loose rivets, cracks or buckling in skin, security, and condition of actuators and screws.

26. Upper Surface of Wing Flaps – Checked

Check upper surfaces for loose rivets, cracks or buckling in skin, security, and condition of rollers and connecting links.

27. Vortex Generators – Checked

Check vortex generators not missing or damaged.

28. Fuselage & Bomb Doors – Checked

Check fuselage and bomb doors for loose rivets, buckling, snow, and ice.

(D) Bomb Bay

WARNING

The bomb door actuator struts will be disconnected before entering the bomb bay if power is applied to the aircraft.

1. Bomb Bay for Leaks, Security of Wires & Cables – Checked

Check bomb bay for fuel and hydraulic leaks, security of wires and cables, and crew movement doors closed.

2. Hydraulic Controllable Check Valve – Handle safety wired closed

Check valve handle perpendicular to hydraulic line.

3. Nuclear Bombs – Check for proper configuration. Use the GROUND SAFEING or SIOP RESTRIKE (MMS NOT AVAILABLE) procedures.

Right Aft Wheel Well

(E) Tires & Hydraulic Lines – Checked

Ascertain tires have been inflated to proper pressure for present gross weight. Check tires for cuts, blisters, and worn spots. Check hydraulic lines for security and leaks. Check bypass key not installed.

2. Safety Switch Linkage, Torsion Link & Oleo Extension – Checked

Oleo safety switch linkage connected and secure. Torsion link connected and pin in place and safetied. Oleo strut for cleanliness, hydraulic leaks, and proper inflation.

3. Landing Gear Ground Lock – Installed

4. Left Brake Accumulator Air Pressure Gage – 1000 (± 200) psi

5. Leaks & General Condition – Checked

Check entire wheel well area for foreign objects, hydraulic or fuel leaks, and security of all equipment.

(F) Right Aft Fuselage

1. Anticollision Light – Checked

Check for cleanliness, security, and glass intact.

2. UHF Command Antenna – Checked

Check for cleanliness and security.

3. Access Panels & Vents – Checked

Check all plugs removed from vents, vents clear and unobstructed, and access panels and ECM antennas secure.

4. Right Oxygen Buildup & Vent Valve Handle – Checked

Check that liquid oxygen buildup and vent valve handle has been placed in SERVICE position. Close and secure access panel.

(G) Aft Equipment Compartment

1. Hatch Jettison Handle – Stowed; pin installed, safetied

2. Rudder Q-Spring – Checked

Check hose and clamp connections.

3. Stabilizer Nut & Jackscrew – Checked

4. Elevator Q-Spring – Checked

5. Powered Rudder/Elevator Systems – Checked

Check for general condition of hydraulic systems; ground cooler blower housing and ducting. Check for system hydraulic leaks.

6. Radio Navigation Equipment Rack – Checked

7. No. 2 & 3 Liquid Oxygen Converters – Checked

WARNING

Do not touch the converters with bare hands as serious injury may result.

8. No. 1 Liquid Oxygen Converter – Checked
9. Camera Cover – Checked

Camera door handcrank removed from door motor and stowed.

10. Aft Body Fuel Tank – Checked
11. Aft AC Power Box – Cover closed
12. Crawlway Door – Closed
13. Leaks & General Condition – Checked

Check for general condition, security of equipment, and loose items; excessive wear or unsafe condition of wiring, control cables, and ducting; hydraulic, fuel, and oxygen leaks.

14. Compartment Hatch – Checked and closed

Check for dents and general condition of latch, hinges, and seals.

(H) Empennage

1. Right Horizontal Stabilizer & Elevator – Checked and set at 0°

Check all surfaces for loose rivets, cracks and buckling in skin, snow and ice, and general condition. Specifically check for ice on seal between stabilizer and fuselage.

2. Drag Chute Compartment – Checked

Check door closed, handle flush, and crank removed. If the drag chute has been in place during damp weather, check with crew chief to ascertain that chute is dry.

3. Drag Chute Personnel Safety Rod – Removed
4. Vertical Fin & Rudder – Checked

Check all surfaces for loose rivets, cracks and buckling in skin, snow and ice, and general condition.

5. Left Horizontal Stabilizer & Elevator – Checked

Check all surfaces for loose rivets, cracks and buckling in skin, snow and ice, and general condition. Specifically check for ice on seal between stabilizer and fuselage.

6. Air Inlets & Vents – Clear

Inlets and vents clear and unobstructed. Q-spring opening in leading edge of fin clear.

(I) Left Aft Fuselage

1. Ammunition Door – Closed
2. Electronics Rack Door – Closed
3. Left Liquid Oxygen Buildup & Vent Valve Handles (2) – Closed

Check that liquid oxygen buildup and vent valve handles have been placed in SERVICE. Close and secure access panels.

4. ECM Antenna – Secure
5. V/UHF LOS Antenna – Check for cleanliness and security

WARNING

Care should be taken when maneuvering around antenna protruding from the underside of the aircraft. Failure to exercise caution could result in injury to the head and/or eyes.

6. Electronic Ram Airscoop – Unobstructed

(J) Left Aft Wheel Well

1. Tires & Hydraulic Lines – Checked

Ascertain tires have been inflated to proper pressure for present gross weight. Check tires for cuts, blisters, and worn spots. Check hydraulic lines for security and leaks. Check bypass key not installed.

2. Safety Switch Linkage, Torsion Link & Oleo Extension – Checked

Oleo safety switch linkage connected and secure. Torsion link connected and pin in place and safetied. Oleo strut for cleanliness, hydraulic leaks, and proper inflation.

3. Landing Gear Ground Lock – Installed
4. Right Brake Accumulator Air Pressure Gage – 1000 (±200) psi
5. Leaks & General Condition – Checked

Check entire wheel well area for foreign objects, hydraulic or fuel leaks, and security of all equipment

6. Hydraulic Controllable Check Valve – Handle safety wired closed

Check valve handle perpendicular to hydraulic line.

(K) Left Wing

Repeat procedures for right wing in the following order:

1. Fuselage & Bomb Doors – Checked
2. Vortex Generators – Checked
3. Upper Surface of Wing Flaps – Checked
4. Lower Surface of Wing Flaps – Checked
5. Inboard Wing Flap Well – Checked
6. Outboard Wing Flap Well – Checked
7. Outboard Wing Trailing Edge – Checked
8. Wing Tip & Upper Surface – Checked
9. Access Panels & Surge Tank Vents – Checked
10. External Tank – Checked

Check access door and filler neck cap secure and surge tank vent clear of obstructions.

11. Left Taxi Light – Checked
12. Oleo Strut, Wheel & Tire – Checked
13. Tip Gear Ground Lock – Installed
14. Tip Gear Well & Door – Checked
15. Access Panels, Vents & Drains – Checked
16. No. 1 Strut for Condition – Checked
17. Engines 1 & 2 Aft Section – Checked
18. Nacelle Cowlings & Surge Bleed Valves (2)

– Checked

19. Constant Speed Drive Oil Cooler & Generator Cooling Air Exhausts – Checked
20. Nose Sections 1 & 2 – Checked
21. Access Panels, Vents & Drains – Checked
22. No. 2 Strut for Condition – Checked
23. Heat Exchanger, Ram Air Inlet – Checked
24. Engines 3 & 4 Aft Sections – Checked
25. Nacelle Cowlings – Checked
26. Constant Speed Drive Oil Cooler & Generator Cooling Air Exhausts – Checked
27. Nose Sections 3 & 4 – Checked
28. Access Panels, Vents & Drains – Checked

(L) Left Forward Wheel Well

1. Wheel Chocks – In place
2. Tires & Hydraulic Lines – Checked

   Ascertain tires have been inflated to proper pres- sure for present gross weight. Check tires for cuts, blisters, and worn spots. Check hydraulic lines for security and leaks.

3. Safety Switch Linkage, Torsion Link & Oleo Extension – Checked

Oleo safety switch linkage connected and secure. Torsion link connected and pin in place and safe- tied. Oleo strut for cleanliness, hydraulic leaks, and proper inflation.

4. Landing Gear Ground Lock – In place
5. Right & Left Forward Brake Accumulator Air Pressure Gages – 1000 (±200) psi
6. Hydraulic Handpump – Handle stowed
7. Battery Cover & Drain Lines – Secure

Check covers fastened.

8. Battery Condition – Checked

Check the CHARGER FAULT, BATTERY FAULT, and BATTERY READY indicators for battery and charger operational status.

9. Leaks & General Condition – Checked

Check entire wheel well area for foreign objects, hydraulic or fuel leaks, and security of all equipment.

10. Landing Light – Checked

Check left landing light for cleanliness and security and glass and filament intact.

(M) Left Nose Section

1. Air Ducts & Vents – Clear

Check all vent openings clear, access doors secure, and duct plugs removed.

CAUTION

Operation of an air conditioning unit with the wing duct plugs in place can result in destruction of the unit due to overspeeding of the turbine-driven blower.

2. Static Ports & Drain Plugs – Checked

Check static ports clear and drain plugs installed. (Three ports are located high on side of fuselage.)

3. Escape Hatch – Secure

Check left escape hatch secure and flush with the aircraft skin.

4. Pitot Tube Covers – Removed and clear
5. EVS STV Turret – Free and unobstructed
6. Inlet Ram Airscoops – Unobstructed

INTERIOR INSPECTION CHECKLIST

1. Load Central Circuit Breakers – IN (P-CP)

1. IP Oxygen Regulator – OFF and 100% (CP)

2. Pilot & Copilot Oxygen Bottles – Serviced and stowed (CP)

4. Ejection Seat: (P-CP)

   a. Arming Levers – Stowed, No. 1 safety pins installed and locked

   b. Hatch Link – Checked

      Check link connecting escape hatch to catapult safety pin-pull initiator.

   c. Safety Pins No. 2, 3 & 5 – Checked removed

   a. Oxygen Regulator – Set

      While holding breath, position the Supply Lever to ON and the Emergency Oxygen Toggle Lever to EMERGENCY.

   b. Oxygen Regulator Emergency Toggle Lever – NORMAL

   10. Pilot's Side Panel: (P)

      a. Readiness Switch Cover – Closed, sealed

      b. Pylon Jettison Consent Switches (2) – Guards closed and sealed

      c. Circuit Breakers – In

      d. Missile/Munitions Consent Panel – Guards closed and sealed

         Prearm-Off switch and Lock-Unlock switch, check that both switches are closed and sealed (if weapons are loaded).

e. IFF Antenna – BOTH

f. Antiskid – ON, guard closed (P)

CAUTION

Apply firm pressure to the toggle switch when placing it to the ON position and absolutely ensure it is fully and completely on before closing the guard.

g. Mach Indicator – ON (P)

NOTE

The Mach indicator will be unreliable and needle oscillation may occur until sufficient pitot pressure is attained during takeoff. The pilot should expect and disregard this oscillation.

h. Pilot's MFD Display Control Panel – Set, as required

i. Hydraulic Standby Pumps – OFF

j. Launcher Hydraulic Control Switch – OFF

k. Rudder/Elevator Hydraulic Pumps – OFF

l. Flare Set Power – OFF

The OFF position of the switch is the center position of a three-position switch. The switch locks in the center position and is ON in the up position. The down position has no function.

11. Copilot's Side Panel: (CP)

a. Circuit Breakers – IN

b. Manifold Valve – OPEN

c. Fuel Enrichment Valve Switch – CLOSE

d. Engine Starter Switches – Set

OFF and PNEUMATIC (for pneumatic start); START and FLIGHT (for cartridge start).

f. Generator Selector – CENTRAL BUS TIE

g. Generator Drive Decouplers – NORM

NOTE

If a generator drive decoupler switch is found in MON position, it is possible the generator drive has been inadvertently decoupled. Verification by flightcrew that a generator drive is not decoupled can be made only by starting the engine and checking the generator for operation.

h. Battery – OFF

i. Battery Charge Test – OFF

j. Copilot's MFD Display Control Panel – Set, as required

12. Air Outlet Knob – Full out (P-CP)

15. Clock – Set (P-CP)

16. Landing Gear Emergency Switches – Guards closed and safety wired (P)

Tip gear do not require safety wiring.

17. Fuel System Switches – OFF and CLOSED (CP)

Copilot will ensure all switches on scavenge, fuel, defuel, and air refueling panels are OFF or CLOSED.

18. Radar Altimeter – Set 1500 feet (P-CP)

19. Yaw & Pitch SAS – DISENGAGE (P)

20. Steering Ratio – TAKEOFF LAND (P)

*21. Airbrakes – OFF (P)

*22. Landing Gear Lever – Down (CP)

Copilot will ensure landing gear handle in detent position.

23. Air Conditioning Panel – SET (CP)

a. Pressure Release Switch – Guard closed

b. Bleed Selector Switch – NORMAL LH INBD guard closed

c. Air Conditioning Master Switch – OFF (RAM, if cooling air connected)

CAUTION

The external air conditioning unit will be disconnected from the cabin emergency ram airscoop before scoop is retracted.

d. Temperature Selector – AUTOMATIC (temperature as desired)

24. Thrust Gate – Checked and stowed (CP)

Check thrust gate for freedom of movement and the ability to override the thrust gate with the throttles.

25. Throttles – CLOSED (CP)

26. Drag Chute Lever – Checked and LOCKED (CP)

27. Flap Lever – OFF (CP)

28, Stabilizer Trim Cutout Switch – Guard closed (P)

29. Lateral Trim Cutout Switch – Guard closed (P)

30. Terrain Display Mode Selector – OFF (CP)

31. Crosswind Crab Knob – Down (P)

BEFORE STARTING ENGINES

BEFORE STARTING ENGINES CHECKLIST (Pilot/Copilot reads)

1. Interphone – Checked (P-CP)

   Pilot and copilot check for operation of the interphone system by noting sidetone. At time of turning interphone power switch to ON, the aft battery discharging light should come on and the forward battery discharging and end-of-life lights should remain out.

   NOTE

   - If aft battery discharging light does not come on, turn battery switch ON. Check that aft battery discharging light comes on and place bat- tery switch OFF.

2. Gyro Power – ON (P)

3. Emergency DC Power Switch – EMER, checked, NORMAL (P-CP)

4. Battery – ON, lights checked (CP)

   Both battery discharging lights and battery caution light should come on and end-of-life lights should remain out.

6. External Power – ON (CP)

   External power circuit breaker position indicator will not close if phase sequence is not correct or if generator circuit breaker is closed. Both battery discharging lights should go out.

7. Main Tank Low Warning Light – Checked on (CP)

   Check main tank low warning light immediately after external power is on and prior to main tank gages indicating 4000 pounds.

8. CG/FLAS Power Switch – ON (CP)

9. Antiskid Indicator Panel – Checked (CP)

   a. Antiskid Test Switch – GND

      Check that all indicator lights are on. Failure of any light to illuminate indicates there is no power to the antiskid shield for that wheel, and antiskid protection will not be available for that wheel.

      NOTE

      - If all eight lights fail to come on, confirm that the anti-skid switch is ON.
      - If anti-skid switch is ON, and all lights fail to come on, call for maintenance assistance.

   b. Antiskid Test Switch – FLT

      Check that all indicator lights are off. If any light should come on with the airplane on the ground and the test switch placed in the FLT position, it indicates that the wheel brake for the wheel represented by the light is in a release condition and braking will not be available to that wheel.

NOTE

If any light comes on when the test switch is placed in the FLT position, call for maintenance assistance.

10. IFF – STBY, codes set (P)

11. Radios – ON (CP)

12. Warning & Indicator Lights – Press-to-test (P-CP)

    Pilot and copilot press-to-test all warning and indicator lights that are not illuminated. The TACAN TEST light will be tested during radio check. Pilot tests central caution panel lights and master caution light. Copilot tests oil temperature overheat light and master caution light. All central caution panel lights and the marker beacon lights are checked by pressing test switch adjacent to central caution panel. Pilot and copilot actuate lamp test switches to test EVS panel indicator lights. Press TA test button above EVS monitor to check TA indicators. Press to test radar altimeter caution lights. Pilot and copilot press attitude select test switch. NORM and ALT come on.

13. Engine Fire Shutoff Switches – In and checked (P-CP)

    Push engine fire shutoff switches to NORMAL (in) and check fire detector system and lights by moving the fire detector switch to TEST.

14. EVS Power – OFF (P-CP)

    Check EVS power switch in OFF position by noting integral indicator not illuminated.

15. Oxygen Quantity – Checked (P)

    The quantity gage needle should move toward the zero liter position when the press-to-test switch is held depressed and should return to the initial indication when the switch is released. The pilot compares the quantity with Form 781.

16. Anticollision & Navigation Lights – ON, STEADY and BRIGHT (P/CP)

17. Ground, Connect & Clear Bomb Doors – Connected and clear (GC)

18. Fuel Quantity Check – Completed (P-CP)

    Copilot depresses fuel quantity gage press-to-test button to assure proper operation of fuel gages. Copilot calls off individual tank identity and gage reading to the pilot who records them in the No. 2 column of the fuel log. The pilot cross-checks the fuel load dipstick readings from Form 6 with individual tank gage reading and planned fuel load as recorded in the fuel log. The pilot totals the individual tank gage readings and compares the total with the totalizer reading. Copilot sets best flare speed computer ring to operating weight plus expendable stores.

NOTE

- Fuel will be loaded symmetrically in the main, outboard, and external tanks. If the difference between a gage reading and dipstick reading, or planned fuel for tank and dipstick reading

- Stabilizer trim should be recomputed for any one tank dipstick reading (gage reading if not dipped) differing from the planned fuel loading by 1000 pounds or if the absolute total of the differences for all tanks between planned fuel loading and dipstick reading (gage reading if not dipped) exceeds 2000 pounds.

19. Flutter Advisory Selector Switch – As required (CP)

20. Radios – Checked (P-CP)

    a. Pilot Check VOR Equipment:

        (1) Nav Mode Select Switch – VOR

        (2) Tune and identify a VOR station.

        (3) Check that bearing pointer points to the station.

        (4) Set bearing pointer indicator in the course selector window and check that CDI centers and the TO-FROM indicator indicates TO.

        (5) Rotate the course set knob ±5° to check for proper CDI displacement.

        (6) Rotate course set knob and check that TO changes to FROM indication after approximately 90° of course selector change.

    b. Pilot Checks TACAN Equipment:

        (1) Nav Mode Selector Switch – TACAN

        (2) Tune and identify a TACAN station.

        (3) Repeat steps (3) thru (6) above using TACAN.

        (4) Check TACAN range indicator warning flag out of view and distance indicates correctly.

        (5) Set X-Y channel selector and select any channel that cannot be received in the area where the test is being accomplished.

        (6) Select CDI course of 180°.

        (7) Momentarily depress test switch.

            (a) Test light momentarily flashes.

            (b) DME mask and course warning flag on ADI in view.

            (c) HSI bearing pointer moves to 270°.

            (d) DME mask and course warning flag on ADI drive out of view.

            (e) DME shows 000.0 (±0.5); bearing pointer shows 180° (±3°).

            (f) Course deviation indicator centered (±1/2 dot) and TO-FROM indicator on HSI indicates TO.

NOTE

- Test indications last about 15 seconds.
- See Section I for more detailed information about functions.

(8) Test Light – Off

NOTE

- REC mode may be used. DME will not be available, but other indications will function normally if the TACAN test light does not stay on. With the exception of DME, test cycle will function the same way.

c. Copilot checks primary and secondary radios and obtains altimeter setting. Copilot checks operation of LOS radio ARC-171(V) as follows:

(1) Interphone selector switch to UHF No. 2.

(2) LOS radio function select switch on BOTH.

d. V/UHF Radio – Set and functioning (CP)

(1) VOL/SQ OFF – In and midrange

(2) V/UHF Radio Reception and Volume – Checked (CP)

23. Radar Altimeters – Checked and OFF (P-CP)

a. OFF Flag – Out of sight

b. Cursor – Check set at 1500 feet

c. Control Knob – Press

The indicator needle should point to 1000 (±100) feet, the system test light, the indicator low altitude caution light, and the RDR ALT LOW light should come on.

d. Radar Altimeter – OFF

24 Altimeters – Checked and RESET (P); Checked and STBY (CP)

a. Altimeters – Set, STBY flag in sight

Ensure that each altimeter indicates (±75) feet of a known check point elevation. Pilot checks that an altimeter correction card is installed for proper aircraft configuration.

b. RESET-STBY Lever – RESET

Hold in RESET position 2 to 3 seconds.

c. STBY Flag – Out of sight

Compare altimeter readings with standby mode reading. Altimeter should read within 75 feet of standby mode reading. Ensure that each altimeter indicates (±75) feet of a known checkpoint elevation. Pilot's and copilot's altimeters should read within 75 feet of each other. This allowable difference of 75 feet between servo mode readings also applies in flight at all altitudes and speeds.

NOTE

- If the STBY flag appears and mission requirements allow, the mission may be completed.

- For flight conducted by the copilot, his altimeter may be operated in RESET and the pilot's in STBY.

26. Elevator & Rudder – Checked and OFF (P); Checked (CP)

NOTE

For thruflight sorties confirm with ground crew that ground cooling system is operating. No other checks are required.

a. Rudder/Elevator Main & Aux Lights (four lights) – On (P)

b. Rudder/Elevator Hydraulic Switches – ON, lights out (P); cooling air checked (GC)

Check main and aux hydraulic system lights out.

CAUTION

- Immediately after placing rudder/elevator hydraulic switch to ON, pilot will confirm with ground crew that ground cooling system is operating. Ground crew should report air blowing out of two exhaust ports.

- Maximum time that rudder/elevator hydraulic systems can be operated without ground blower in operation is 4 minutes.

c. Elevator Check:

(1) Control Column - Full forward

Ground Observer reports position of elevators.

(2) Control Column - Full back

Ground Observer reports position of elevators.

d. Rudder & Rudder Trim Check:

(1) Rudder Pedal - Full left

Ground Observer reports position of rudder.

(2) Rudder Pedal - Full right

Ground Observer reports position of rudder.

(3) Rudder Pedals & Rudder Trim Knob - Centered

Ground Observer reports position of rudder.

e. Rudder/Elevator Hydraulic Switches - OFF (P)

f.

28. Standby Hydraulic Pump Pressure - Checked (P)

Pilot places standby pump switches to STBY and observes buildup of outboard wing and left body pressures to 3000 (±250) psi. For a valid indication of right body standby pump pressure, momentarily place RUD/ELEV MAIN 2 switch ON and the right body pressure should read 3000 (±250) psi.

NOTE

Before turning the RUD/ELEV MAIN 2 switch ON the right body standby pump pressure should read 2500 (±250) psi and may also fluctuate ±300 psi due to normal cyclic operation of the hydraulic transformer. If the pressure reading is low, rudder/elevator actuator bypass valves may be open. Turning MAIN 2 switch ON will close the right hydraulic transformer shutoff valve and pressurize rudder/elevator hydraulic system No. 2 sufficiently to close the actuator bypass valves. With MAIN 2 switch ON, right body pressure should read a constant 3000 (±250) psi. After turning the MAIN 2 switch OFF the pressure should drop to 2500 (±250) psi and resume cyclic fluctuation. Right body system may not reach 3000 (±250) psi if the manual check valve is open, if bypass keys are installed and/or there are no pressure inputs into another system. Rudder pedals should be activated slightly to en- sure there are no inputs to other systems.

29. Ground, Remove Ground Locks - Removed (GC)

28. Autopilot – Checked and OFF (P)

a. Check turn knob and roll trim knob in detent position.

b. Place autopilot power switch - ON

c. Accomplish built-in test (BIT) sequence check.

d. Depress pilot's autopilot release button; autopilot should disengage and the AUTOPILOT DISENGAGED light comes on.

e. Turn autopilot power switch – OFF

29. Airbrake, Spoiler & Lateral Trim Check – Completed (P-CP)

CAUTION

To prevent pump overheating, the ground test pumps will be limited to 5 minutes continuous operation.

NOTE

- This check is made in coordination with ground crew observer. Ground crew will hold ground test switches ON during this check. Ground crew observer will report position of spoilers after each movement.

- Spoiler rigging tolerances are such that the spoiler groups on each wing may not exactly line up during partial or full extension of the spoilers. Also, when airbrakes are in position 6, additional raising of the spoilers on a wing when the control wheel is moved out of neutral is normal and the outboard segments will raise from 50° to 60° as more control wheel rotation is applied.

a. Airbrake & Spoiler Check:

(1) Move airbrake to position 6. Ground reports: Inboard 60°; outboard 50°.

NOTE

Wing droop associated with high gross weight fuel loads may make it impossible to see the outboard airbrake segments from the cockpit. These segments will be at 50° instead of 60°.

(2) Move control wheel: Ground reports:

POSITION	LEFT SPOILERS	RIGHT SPOILERS
Full left	Up	Down
Full right	Down	Up
Neutral	Inboard 60°	Inboard 60°
	Outboard 50°	Outboard 50°

NOTE

Full control wheel travel results in both inboard and outboard spoiler segments assuming the full 60° extension (i.e., with airbrakes in position 6, control wheel displacement to full left causes the left spoilers to move from inboards 60°, outboards 50° to both segments 60°, and right spoilers from inboards 60°, outboards 50° to both segments zero. Returning control wheel to neutral with airbrakes in position 6 causes spoilers to assume the position of inboards 60°, outboards 50°).

(3) Airbrake Lever – OFF

Ground reports, "All airbrakes down."

b. Lateral Trim Check:

(1) Lateral Trim Button – LDN (left wing down)

Copilot actuates trim control button to LDN and moves control wheel to new center position. Pilot actuates lateral trim cutout when trim indicator reaches approximately 5°. Copilot releases trim button, pilot places trim cutout switch in NORMAL, guard closed. Ground observer reports, "Left spoilers up, right spoilers down." Pilot notes the movement of trim indicator.

(2) Lateral Trim Button – RDN (right wing down)

Pilot returns lateral trim to neutral and moves control wheel to neutral. Ground observer reports, "All spoilers down." Pilot observes trim indicator for correct indication.

30. Wing Standby Pumps – OFF (P)

31. Flaps – Checked and up, lever OFF (CP-GC)

Flaps should be full down at the time the crew enters the aircraft. Ground personnel will be on interphone and advise the pilot of flap position and movement. Flaps should be checked that they retract in approximately 60 seconds.

CAUTION

To prevent inadvertent movement of the wing flaps after the desired flap position is obtained, the wing flap lever will be left in DN position at all times when full flap extension is desired. To prevent flap motor damage which may be caused by limit switch actuation after flap re- traction, the lever will be moved to OFF when the flaps up indication is received.

34. Fuel Panel Switches – Set (CP)

CAUTION

Closure of the main tank switch guard may not actuate the boost pump switch to the ON position. Apply firm pressure to the toggle switch when placing it to the ON position and absolutely ensure it is fully and completely ON before closing the guard.

NOTE

- For external cruise missile configurations refer to the appropriate cruise missile takeoff fuel sequence.
- For external nonnuclear weapons configuration, see FUEL SYSTEM MANAGEMENT, Section I.
- For JP-4 configured alert aircraft, run all engines at idle rpm for 10 minutes using JP-4 from the mid-body and external tanks with main tank fuel boost pumps OFF. After engine shutdown, configure the fuel panel to feed mid-body and mains (pumps ON) to all engines for engine start, taxi and takeoff. After takeoff, resume applicable fuel sequence at the appropriate step.

a. 1 & 4 Above Green Band, Center & Aft Contains 2000 Pounds or More Each – 1, 2, 3, and 4 ON; 13 and 16 OPEN; 26 and 28 ENGINE FEED

b. 1 & 4 Above Green Band, Either Center Wing or Aft Body Less Than 2000 Pounds Each – 1, 2, 3, and 4 ON; 9, 10, 11 and 12 OPEN

c. 1 or 4 In Green Band – 1, 2, 3, and 4 ON; 9, 10, 11, and 12 OPEN

35. Gyro Instruments – Checked (P-CP)

a. Check HSI heading.

b. Check both ADI's for indication of power application by noting gyros properly erected and OFF flags and ATT warning flags not showing. Rotate attitude indicator pitch trim knob clockwise and attitude indicator should read at least 10° dive. Rotate pitch knob counterclockwise and attitude indicator should read at least 5° climb.

c. Standby attitude indicator should be erected and OFF flag out of view.

d. Heading indicator (gyro) set to aircraft heading.

37. Steering Ratio – TAXI (P)

38. Windshield Anti-Icing & Defog – NORMAL (P)

39. Circuit Breakers – As required (P-CP)

40. Crew Report – Completed (P)

    a. Pilot actuates the emergency alarm switch to ABANDON, presses the CALL button and announces "Crew report."

    b. The sequence for crew reporting is as follows: N, G, EW, RN, CP, P, IN, DI, 10th, IP.

    c. All crewmembers will press call button and report "(crewmember's) check complete." The check consists of abandon signal and call operation. If a crewmember was not at his seat during the check, on return to his seat, the interphone call operation will be checked with the pilot.

    d. Ground crew checks the alarm system in the bomb bay and reports condition to pilot.

41. CG/FLAS – Initialized, if time permits (CP)

    a. PWR Switch – ON

    b. Initialization – Accomplished

        (1) Operating weight loaded.

        (2) Operating weight cg loaded.

        (3) Weapons loaded (Available with weapon module).

        (4) Flares & chaff loaded (Available with weapon module) .

    c. Mode – Selected

    Select FUEL, WPN, or WT mode as appropriate to monitor aircraft flight condition.

NOTE

- For normal training missions, disregard the remaining items in this checklist and proceed to STARTING ENGINES AND BEFORE TAXIING checklist.

- The aircrew may leave their stations provided they can assure that the configuration of the various controls and switches will not be changed. If not, they will accomplish the BEFORE LEAVING AIRCRAFT checklist. Upon returning to the aircraft for flight, the INTERIOR INSPECTION and BEFORE STARTING ENGINES checklists will be reaccomplished for switch positioning prior to starting engines. This requirement does not apply when preparing the aircraft for alert posture.

- For alert posture, engines will be started to check and set stabilizer trim. If no maintenance is required on the aircraft subsequent to the stabilizer trim check or taxiing to the alert area (if applicable), the recocking checklist will be used to recock the aircraft.

42. Oxygen Regulator – OFF and 100% OXYGEN (if leaving the aircraft for an extended period of time) (P, CP)

43. Flash Blindness Equipment – Checked and positioned (if applicable) (ALL)

    Flash blindness equipment (gold goggles, eye patches, etc) will be checked and positioned in accordance with command directives.

44. Ground, Close Entry Door – Roger (GC); Light out (P)

WARNING

The external air conditioning unit can build up sufficient cabin pressure to cause the entry door to blow. Ascertain that a sliding window is open prior to opening or closing the door.

NOTE

The main entry door will be locked to prevent loss of pressurization during flight. The door can be locked from the inside only.

45. Ground, Open Entry Door – Roger (GC)

46. Engine dc Ignition Circuit Breakers – Pulled (P-CP)

    Pull the corresponding engine dc ignition circuit breaker(s) for the engines to have cartridges installed. Outboard engine dc circuit breakers are located on the left load central (LLC) circuit break- er panel. Inboard engine dc circuit breakers are located on the right load central (RLC) circuit break- er panel.

47. Cartridges – Installed (As required) / Use options panel on the front of the glareshield

48. Bomb Doors – Closed (Alert only) (P)

    Bomb doors will be closed and remain closed on alert aircraft except for required maintenance and special weapons inventory.

STARTING ENGINES AND BEFORE TAXIING

STARTING ENGINES AND BEFORE TAXIING CHECKLIST (Pilot reads)

NOTE

- Only the boldface items need be accomplished for Scramble. All items will be reviewed during climb or as soon as practicable.
- During SIOP alert operations, takeoff will not be delayed for items pertaining to crew equipment, radio checks, and IFF settings.
- Engines will not be started until both pilots are in position.

1. **BRAKES – SET (P)**
2. **BATTERY – ON (CP)**
3. **INTERPHONE – ON (P)**
4. External Power – ON (CP)

CAUTION

The battery override switch will not be used for normal training missions.

For normal operations, place external power on the aircraft by placing the external power switch to ON. During alert operations or when time is not available to allow external power cart to warm up properly, place external power on the aircraft in the following manner:

a. Isolate Button – Pressed

b. External Power Switch – ON

c. Generator Switches – OFF

Momentarily position generator switches to OFF one at a time and check generator circuit breakers open and bus tie circuit breakers closed.

5. Ground, Close Entry Door – Roger (GC)

WARNING

The external air conditioning unit can build up sufficient cabin pressure to cause the entry door to blow. Ascertain that a sliding window is open prior to opening or closing the door.

NOTE

The main entry door will be left unlocked during engine start.

5A. FUEL ENRICHMENT VALVE SWITCH – AS REQUIRED (CP)

FEV will be open for starts using JP-5 or JP-8 and outside air temperature at or below 0°C (32°F). FEV may be used between 32°F and 40°F.

NOTE

If the airplane is fueled with fuel other than JP-4 or AVGAS, fuel enrichment must be used for starting when fuel temperatures are below 0°C (32°F). Engine starts can be difficult or impossible if outside air temperature is below –30°C (–22°F).

6. Ground, Start External Air – Roger _____ PSI (Use options panel on the front of the glareshield)

6A. Anticollision Lights – ON (P/CP)

Leave the lights off if turning the lights on will create a safety hazard for ground personnel.

7. START ENGINES – STARTED (CP)

NOTE

- If maintenance or other conditions require starting engines in a sequence other than outlined below, engines will be started individually to preclude possible hot starts. When engines are started one at a time, engines operating above idle rpm should be retarded to idle. The starter should first be placed on and then an engine advanced to provide an air bleed source. This is done to prevent starter damage due to bleed air surge.

- External electrical power units will be used for engine starts. Battery starting procedures may be used in the event of external power unit failure. While on alert, battery starting procedures will be used; the external power unit will be positioned for use in the event of battery failure.

- If engine smoke conditions cause an adverse environment for ground personnel, the stabilizer trim check may be accomplished after starting only engines 4 and 5.

The following procedures are designed to be used for starting engines with or without external electrical power. The battery system may not be dependable at low temperatures. When battery start procedures are used, all normal engine and generator starting precautions will be used; engine oil pressure and fuel flow indication will be inoperative until a generator is on the line.

NOTE

- Pilot monitors starting sequence to prevent engines from exceeding limitations.

- Combustion, indicated by a rise in exhaust temperature, will occur within 20 seconds after throttle is advanced. During a normal start, fuel flow indication will begin upon movement of the throttle from CLOSED to IDLE and will increase as scheduled by the fuel control unit to provide starting acceleration fuel to a peak value after which it will decrease to a range of 550 to 1200 pph following stabilization at idle rpm. Fuel flow rates in excess of the above figures can warn of a hot start condition. If fuel flow is below 550 pph, retard throttle to CLOSED, place starter switch to OFF, allow at least 30 seconds for fuel drainage, and check for malfunction before attempting a restart.

- Normal starting procedures should be used for all starts; however, if an engine gives an indication of a hung start in the 26% rpm range, proceed with engine shutdown and discontinue starting attempts. Engines 1, 2, 7, and 8 are already provided with auxiliary boost pump pressure, but if one of the inboard pod engines 3, 4, 5, or 6, which are feeding from main fuel tanks gives an indication of a hung start in the 40% to 52% rpm range, auxiliary boost pump pressure should be sup- plied by turning the applicable auxiliary tank engine feed control switch (No. 14 or 15) to OPEN. After the engine accelerates to IDLE, return the fuel system to its original starting configuration. However, if the engine does not accelerate to IDLE, proceed with engine shut- down and discontinue

starting attempts.

- Except during SIOP/ALERT starts, or any other situation requiring an immediate engine start, allow all engines to idle for 2 minutes prior to advancing throttles. This will help preclude premature engine wear due to hot section fatigue.

CAUTION

- Advancing the throttle before 15% rpm is reached increases the possibility of a hot start.

- Starter dropout should occur at approximately 35% to 45%. In order to prevent starter internal failure in case starters fail to drop out, the starter switches are moved to CONT as the engines attain 45% rpm.

- Oil pressure will be 35 psi minimum within 30 seconds. Disregard the low oil pressure warning lights when oil pressure is below 40 psi.

- If external electrical power is lost during an engine start and engines 1, 2, 7, or 8 are below approximately 35% rpm, immediately retard the throttle to CLOSED and discontinue the start until electrical power is restored. The loss of ac power (and TR power) will close outboard strut air bleed valves depriving the engine of starter assistance. This may result in a hot start if the throttle is not closed. To prevent starter damage due to bleed air surge, engine(s) operating above idle rpm should be retarded to idle before any subsequent attempt to restart.

- On first starting a cold engine, the initial idle rpm may be below the stabilized range of 57% to 60%. This initial low–idle rpm is usually in the range from 55% to 57%. Engine throttles 1, 3, 5, and 7 should be positioned to obtain a minimum of 58% rpm to provide safe operating speed for the constant speed generator drives.

- Avoid reengaging the engine starter while the engine is still rotating unless it becomes necessary to do so. Such practice may reduce starter service life.

- To prevent damage to wing flap structure, operation at engine rpm greater than 92% with wing flaps extended should be kept to a minimum.

Pneumatic Start – With External Electrical Power

NOTE

a) Verify that the pneumatic start station is enabled in the Options menu.
b) Check all engine starter switches in OFF and PNEUMATIC.

Pilot announces “Starting No. 4.” Copilot positions No. 4 starter switch to START. At a minimum of 15% rpm, pilot advances throttle to IDLE. As No. 4 reaches 45% rpm, copilot places No. 4 starter to CONT. After No. 4 engine has stabilized in IDLE for 2 minutes, pilot announces “Starting No. 5”. Copilot positions No. 5 starter switch to START. Pilot advances No. 4 throttle to an rpm that ensures adequate airflow to obtain 15% rpm on the No. 5 engine. At a minimum of 15% rpm, pilot advances No. 5 throttle to IDLE. As No. 5 reaches 45% rpm, copilot places No. 5 starter switch to CONT. Pilot retards No. 4 throttle to IDLE. After No. 5 engine has stabilized in IDLE for 2 minutes, pilot announces “Start the remaining engines.” Copilot positions No. 1, 2, 3, 6, 7, and 8 starter switches to START. Pilot advances No. 4 throttle to 90% rpm and No. 5 throttle to 85% rpm. As the remaining engines reach a minimum of 15% rpm, pilot advances throttles No. 1, 2, and 3 and copilot advances throttles No. 6, 7, and 8 to IDLE. As the engines reach 45% rpm, copilot positions the respective starter switches to CONT. Engines 1, 2, 3, 6, 7, and 8 must be stabilized in idle for 2 minutes.

Pneumatic Start – Without External Electrical Power

NOTE

c) Verify that the pneumatic start station is enabled in the Options menu.
d) Check all engine starter switches in OFF and PNEUMATIC.

Pilot announces “Starting No. 4.” Copilot positions No. 4 starter switch to START. At a minimum of 15% rpm, pilot advances throttle to IDLE. As No. 4 reaches 45% rpm, copilot places No. 4 starter to CONT. After No. 4 engine has stabilized in IDLE for 2 minutes, pilot announces “Starting No. 5”. Copilot positions No. 5 starter switch to START. Pilot advances No. 4 throttle to an rpm that ensures adequate airflow to obtain 15% rpm on the No. 5 engine. At a minimum of 15% rpm, pilot advances No. 5 throttle to IDLE. As No. 5 reaches 45% rpm, copilot places No. 5 starter switch to CONT. Pilot retards No. 4 throttle to IDLE, copilot turns No. 5 generator to ON when engine No. 5 reaches 58% rpm. After No. 5 engine has stabilized in IDLE for 2 minutes, pilot announces “Start the remaining engines.” Copilot positions No. 1, 2, 3, 6, 7, and 8 starter switches to START. Pilot advances No. 4 throttle to 90% rpm and No. 5 throttle to 85% rpm. As the remaining engines reach a minimum of 15% rpm, pilot advances throttles No. 1, 2, and 3 and copilot advances throttles No. 6, 7, and 8 to IDLE. As the engines reach 45% rpm, copilot positions the respective starter switches to CONT. Engines 1, 2, 3, 6, 7, and 8 must be stabilized in idle for 2 minutes.

Cartridge Start

CAUTION

During operation of the cartridge-pneumatic starter system, observe limitations given in Section V.

NOTE

- Verify that the starter cartridges are loaded in the Options menu.
- This procedure will be used for simultaneous eight engine cartridge starts or any combination of cartridge/pneumatic starts.
- Check all engine starter switches START and FLIGHT.
- Before placing start selector switch to CARTRIDGE, check throttles fully closed to ensure starter cartridge firing/ignition.

- After starting cartridge configured engines when external electrical power is not available, it will be necessary to delay starting other engines which are pneumatically isolated, until a generator is placed on the line to provide TR power for opening outboard strut bleed valves.

Pilot announces "Starting engines _____ (designated)." Copilot positions start selector switch to CARTRIDGE momentarily, then releases to FLIGHT. As each engine reaches a minimum of 15% rpm, advance throttle for that engine to IDLE. For pneumatic starting, advance No. 4 throttle to 90% rpm and No. 5 throttle to 85% rpm. The pilot will advance the throttles for engines 1, 2, 3, and 4 and the copilot No. 5, 6, 7, and 8 as necessary. As each engine reaches 45% rpm, copilot positions the respective starter switch to CONT. After all cartridge started engines are started and the starter switches are in CONT, copilot places start selector to PNEUMATIC and places a generator on the line if necessary to open the strut bleed valves. As each engine reaches a minimum of 15% rpm, advance the throttle for that engine to IDLE. As each engine reaches 45% rpm, copilot positions respective starter switch to CONT.

WARNING

- In the event starter cartridge does not fire, pilot designates engine on which cartridge did not fire to ground crew over interphone. Copilot places that starter switch to OFF. Cartridge will not be removed until there is no evidence of exhaust smoke at the starter exhaust duct and minimum time interval has elapsed since initiation. Prior to removal of a cartridge, ensure that the start selector switch is in FLIGHT and the engine ignition circuit breakers are pulled. The ground crew must observe the handling precautions outlined in Section V. Pilot makes entry on Form 781.

- Simultaneous cartridge starts of QUICK START configured aircraft can produce toxic gases in sufficient concentration to be hazardous to individuals who remain in the immediate vicinity of the aircraft. The potential hazard is dependent on aircraft parking configuration, wind velocity and direction, and other ambient conditions. Ground crewmembers and security police who are required to remain in a toxic cloud will wear proper eye and respiratory protection.

Unsatisfactory Starts

NOTE

In the event any of the unsatisfactory starts described in the following steps occur, proceed as directed. If other starting abnormalities occur, discontinue the starting attempt and investigate. Any of these occurrences, and all cases of exceeding engine operating limits, will be entered in AFTO.

Should an unsatisfactory start occur, the condition will probably be one of the following:

1. HOT START.

Any time an EGT of 450°C is exceeded prior to reaching idle rpm. Engine combustion occurs usually followed by greater than normal fuel flow or faster than normal EGT rise. This is usually an indication of an overrich fuel/air ratio entering the combustion chamber. Such a condition could result from any of several possible causes. Shut down the engine immediately.

2. FALSE OR HUNG START.

Usually characterized by failure of the engine to accelerate to idle rpm after normal combustion and is more likely to occur at temperatures below 45°F (7°C) or above 100°F (38°C). EGT may rise slowly and could terminate in a hot start. This type start could be the result of insufficient air pressure to the starter or starter cutting out early. If engine does not accelerate to idle rpm within 90 seconds, shut down engine.

3. NO START.

Engine combustion does not occur when throttle is advanced. Insufficient electrical power, no fuel to the engine, ignition system, or the fuel control unit could be the cause. If combustion, indicated by a rise in EGT, does not occur within 20 seconds after throttle is advanced discontinue the starting attempt.

CAUTION

Whenever combustion fails to occur, fuel will probably accumulate and be trapped in the engine, creating a potentially dangerous condition if another attempt to start is made before the fuel and fumes are cleared out. Allow at least 30 seconds for fuel drainage before attempting a re- start. If necessary, trapped fuel or vapors can be cleared from the engine by turning the compressor with the starter (motoring) for 10 to 15 seconds with the throttle in CLOSED position.

4. TORCHING DURING START.

This condition may or may not be significant. If accompanied with any abnormal starting indication, shut down the engine. If no other abnormal indication exists, request maintenance direction. Their decision will probably be based on engine history of previous occurrences.

Disconnecting External Air

NOTE

This step may be accomplished after starting engines 4 & 5, prior to starting the remaining engines.

Ground will disconnect external air after engines are started and throttles are retarded to IDLE.

8. Starter Caution Light – Off (CP)

As soon as engines are started, check light off.

9. Navigator, Lock Entry Door – Locked (N); Light out (P)

NOTE

The main entry door must be locked to prevent loss of pressurization during flight. The door can be locked from the inside only.

10. MANIFOLD VALVE – CLOSE (CP)

CAUTION

Place air bleed manifold valve switch in CLOSE position after engines are started to prevent excessive manifold temperature which will be attained if the switch is left OPEN.

11A. FUEL ENRICHMENT VALVE SWITCH – CLOSE (CP)

11. GENERATORS – ON, BATTERY LIGHTS OUT (CP)

NOTE

When conditions permit, if ambient temperature is –12°C (+10°F) or below, idle the appropriate engines for a 5 minute warmup period before placing generators ON.

a. Momentarily hold each generator switch ON to energize the generator field and close the genera- tor circuit breakers (the generators will parallel).

b. Check that generator and bus tie circuit breaker position indicators show closed and generator ammeter readings are the same.

NOTE

- If a generator circuit breaker is open and voltage and frequency are not indicated on the voltmeter and frequency meter, it is probable the gen- erator drive input shaft has been decoupled from the engine shaft.
- If any generator circuit breaker is open with voltage and frequency normal, advance the respective engine throttle, then retard to the de- sired position. Generator circuit breaker should close.

c. Using the voltage and frequency selector, check voltage at 205 (±5) volts and frequency at 400 (±5) Hz on central tie bus. Leave voltage and frequency switch on CENTRAL TIE BUS position.

12. AIR CONDITIONING – 7.45 PSI; NOTIFY GC AND RN (CP)

WARNING

Prior to placing the cabin pressure master switch to 7.45 PSI, the copi- lot will confirm with the ground crew that the ground cooling air cart duct has been removed.

CAUTION

Failure to install the ground cooling cart connector cover will signifi- cantly reduce the cooling airflow. This could result in damage to heat sensitive equipment.

Notify radar navigator that generators are on the line and cooling air is available. If subsequent entry to the forward cabin is required, cabin pressure will be relieved by opening one of the sliding windows prior to opening or closing the entry door.

13. Liaison Radio – ON (CP)

14. Ground, Clear Aircraft for Taxi – Roger (GC)

    Ground crew will disconnect and remove all ground support equipment and stand by on interphone.

CAUTION

The external air conditioning unit will be disconnected from the cabin emergency ram airscoop before the scoop is retracted.

15. IFF – STBY (P)

16. Body Standby Pumps – OFF (P)

17. RUDDER/ELEVATOR – ON, LIGHTS OUT (P)

Pilot checks rudder/elevator main 1 and 2 lights on, rudder/elevator aux 1 and 2 lights out, then places rudder/elevator main 1 and 2 switches on and checks all lights out.

18. Hydraulic Pressures – Checked (P)

    Pilot checks each system for pressure (3000 (±250) psi); pump-out lights off.

19. ENGINE ANTI-ICING – CHECKED (if applicable), AND CLIMATIC (P)

Turn the engine, nacelle, and scoops anti-icing switch ON if either of the following conditions exist or are anticipated during ground operations up through flap retraction altitude:

a. The OAT is 47°F (8°C) or below and visible moisture exists. Visible moisture is defined as rain, wet snow, or fog with visibility 1 mile or less.

b. The OAT is 47°F (8°C) or below and the dewpoint is within 4°F (2.3°C) of the OAT even though visible moisture is not present.

CAUTION

Engine inlet components are susceptible to icing during extended ground operations at IDLE power settings even though engine anti-ice is ON. Periodic engine runups to a nominal 80% rpm can minimize the ice buildup. Such runups should approximate 10 to 20 seconds duration at a maximum of 10 minute intervals. The number of engines to be run up at a time will be dependent upon taxiway surface conditions. Subsequent takeoff under these conditions should be immediately preceded by a static engine runup to assure normal engine operation. Signs of engine icing could include abnormal EPR/EGT relationship, abnormally slow rpm response to throttle movement, and indications of engine surge or stall. If taxiway surface conditions preclude advancing power enough to dissipate or prevent the inlet ice accumulation, takeoff should not be attempted.

20. Stabilizer Trim – Checked, takeoff trim set (P-CP)

NOTE

- For thruflight sorties set stabilizer trim for takeoff. No other checks are required.
- This step may be accomplished after starting engines 4 & 5, prior to starting the remaining engines.

a. Advance engines 4 and 5 to 82% rpm. Ground observer reports direction in which leading edge is moving for both directions operated.

b. Nosedown Trim & Force Switch Operation – Checked

(1) Copilot applies nosedown trim electrically, checking that stabilizer trim wheel and indicator move in correct direction.

(2) Pilot momentarily actuates the trim cutout switch, at approximately 1 unit nosedown position, to check interruption of electrical trim power and abrupt stoppage of manual trim wheel.

(3) Copilot pulls back on his control column while still trimming until trim actuation stops to check force switch operation.

(4) Copilot reduces force on control column and continues nosedown trim until trim actuation starts, then releases trim switch noting that wheel stops abruptly.

(5) Copilot trims electrically toward zero and pushes forward on the control column while still trimming until trim actuation stops to check force switch operation in opposite direction.

(6) Copilot trims to zero with the pilot again checking operation of trim cutout switch after approximately 1 unit of travel.

c. Noseup Trim & Force Switch Operation – Checked

(1) Pilot applies noseup trim electrically, checking that stabilizer trim wheel and indicator move in correct direction.

(2) Pilot pushes forward on his control column while still trimming until trim actuation stops to check force switch operation.

(3) Pilot reduces force on control column and continues noseup trim until trim actuation starts, then releases trim switch noting that wheel stops abruptly.

(4) Pilot trims electrically toward zero and pulls back on control column while still trimming until trim actuation stops to check force switch operation in opposite direction.

(5) Pilot returns stabilizer trim to zero electrically.

d. Ground observer reports leading edge position after pilot returns stabilizer to zero. Acceptable difference between pilot/copilot zero indication and zero indication as reported by ground observer is ±0.25 unit.

e. Pilot manually moves stabilizer trim approximately 1 unit in each direction. Ground observer reports corresponding movement of stabilizer leading edge.

f. Pilot sets stabilizer trim for takeoff. Acceptable difference between pilots' indicators is 0.50 unit.

21. EVS – On (P-CP)

Depress EVS power and STV switches to ON. Rotate brightness knob on monitor clockwise so presentation is just visible and then rotate counterclockwise until presentation just disappears. Rotate contrast knob clockwise until optimum presentation is displayed. After presentation is adjusted, select crab mode and rotate the steering knob left or right to check turret operation.

NOTE

Readjustment of the monitor will normally be required only when significant ambient light changes occur.

22. GPS IU/TACAN Equipment Check – If required (P/CP):

NOTE

The Navigator must have completed GPS initialization with the DDLC installed prior to accomplishing this check.

a. MFD Control Panel MFD EVS Switch – MFD

b. MFD Control Panel Display Mode Switch – Select Mission Route Screen

c. Nav MODE SELECT Switch – TACAN

d. TACAN Control Panel – TACAN channel selected

Selection of the TACAN channel will cause the bearing pointer to point to the selected station, the TACAN range indicator warning flag will be out of view, and the range indicator will display the range to the selected station. The Mission Route Screen on the EVS monitor will display the GPS emulated TACAN data for the currently selected Navaid, including station identifier, chan- nel, radial, and DME.

e. HSI Check:

(1) Check that bearing pointer points to the station.

(2) Set bearing pointer indicator in the course selector window and check that CDI centers and the TO-FROM indicator indicates TO.

(3) Rotate the course set knob ±5° to check for proper CDI displacement.

(4) Rotate course set knob and check that TO changes to FROM indication after approximately 90° of course selector change.

f. TACAN Control Panel – Set Channel, as required

g. Nav MODE SELECT Switch – Set, as required

h. MFD Control Panel MFD EVS Switch – Set, as required

23. Oxygen Regulator – As required (P-CP)

24. BOMB DOORS – CLOSED (P-GC)

Ground personnel will be on interphone and confirm that bomb doors are clear. Pilot will place the bomb door switch to OPEN to ensure that both latches are unlatched, check that the bomb doors not latched light is on, and then place the switch to CLOSED.

25. GROUND, REMOVE WHEEL CHOCKS & DISCONNECT INTERPHONE – ROGER (GC)

26. ANTICOLLISION & NAVIGATION LIGHTS – ON AND STEADY (CP)

Turn anticollision lights on (if not previously turned on) and navigation lights to steady immediately prior to taxiing.

CAUTION

The aircraft may be taxied over the ground power unit. It is imperative that carts be properly positioned to avoid contact with aircraft when taxiing out. Wing flaps will be up. Pilot taxies aircraft straight ahead until ground crew signals that he is clear of the power units. As soon as the aircraft starts rolling, throttles will be retarded to minimum thrust required for taxiing to avoid upsetting the power carts by jet blast. Aircraft will be positioned so that no aircraft will have to taxi over the power carts of another aircraft.

ENGINE GROUND OPERATION

Except for SIOP/alert starts or any situation requiring an immediate start, allow all engines to idle for 2 minutes prior to advancing throttles. Additionally, for temperatures of –31°F (–35°C) and below, engines should be allowed to run at idling speed until engine readings have stabilized and a ground check has been completed. After starting however, the engines (with the exception of engines which are advanced for starting remaining engines) should be allowed to run at idling speed until readings have stabilized and ground check has been completed. After starting a cold engine, the rpm at the initial IDLE setting may be below the stabilized idle range and may require further adjustment of the throttles to increase rpm. Throttles for engines 1, 3, 5, and 7 shall be positioned to maintain a minimum of 58% rpm to provide a safe operating speed for the generator constant speed drives. Rapid movement of the throttles should be avoided at all times to prevent exceeding allowable exhaust gas temperatures. A minimum of 2 seconds should be used for transition from IDLE to maximum allowable. For engine danger areas associated with operation, see figure 2-1.

CROSSWIND OPERATION

During operation of the engines at aircraft velocities of less than 50 knots IAS, the engine stall prevention switch will be used to prevent possible engine stall when both of the following conditions exist:

- Wind velocities are reported by the control tower of 10 knots or more from a direction of 45° or more to the engine centerline when parked or 45° or more to runway heading on takeoff.
- Thrust setting of 1.3 EPR or more.

The engine stall prevention switch will be depressed and held until either an airspeed of 50 (±5) knots is reached or thrust is reduced below 1.3 EPR.

TAXIING AND BEFORE TAKEOFF

PILOT

The pilot releases the brakes upon receiving “Clear to Taxi” signal from the crew chief. When the aircraft starts to roll, a check of brakes should be made. To steer the aircraft, use rudder pedals. Differential braking is not possible and thrust from the outboard engines is ineffective for turning un- less used in conjunction with normal steering. Use the largest radius of turn possible and never at- tempt to steer when the aircraft is not rolling. For minimum turning radius and ground clearance, see figure 2-2. To avoid severe landing gear oscillations during low speed braking and to obtain acceptable brake and tire life and adequate brake performance especially with regard to potential refused takeoffs. To prevent overheating of the forward brakes and exceeding brake energy limits, use minimum power during taxi. If possible, when braking is required, use a firm, steady ap- plication of brakes until aircraft slows to below de- sired taxi speed without applying additional power.

Brake misadjustment combined with abnormal hydraulic pressure may cause wheel shudder/brake chatter during taxi operation with physical characteristics sufficient to contribute to structural failure of gear strut components. Wheel shudder/brake chatter occurring during taxi operation shall be entered in the applicable forms per the POSTFLIGHT checklist in Section II. Normal brake system operation shall be verified by maintenance prior to next flight. If wheel shudder/brake chatter occurs, which in the pilot’s judgment is of severe magnitude, then more immediate action is warranted. Taxi operation should be terminated immediately and maintenance assistance requested. Determining a condition level of severe magnitude will be a qualitative judgment subjective in nature and based on the pilots experience and perception. Wheel shudder/ brake chatter will be assessed subsequent to initial rollout and brake check since some temporary brake chatter unrelated to the misadjustment abnormal pressure condition may occur due to the system being inactive while in the parked mode.

WARNING

If wheel shudder/brake chatter of a severe magnitude occurs during taxi operation, stop immediately and request maintenance assistance.

CAUTION

- To prevent structural damage when making a turn with full rudder travel, maximum ground turning speeds should be 5 knots with ratio selector lever in TAXI or 27 knots with ratio selector lever in TAKEOFF LAND.

- To prevent structural damage during high speed taxi runs, place the steering ratio selector lever in TAKEOFF LAND. Steering in TAXI during high speed taxi runs pro- duces excessive steering when small amounts of rudder pedal displacement are induced which can produce critical side loads on aircraft structure. When taxiing in TAKEOFF LAND, an accumulation of tolerances in the rudder steering system may result in as much as 3 inches of play either side of the rudder pedal neutral position.

- When taxiing at gross weights above 450,000 pounds, taxi speed must be reduced to limit the loads imposed on the aircraft structure. Taxi speeds over rough taxiways should be reduced depending on the degree of roughness and should be limited to a maximum of 5 knots for the worst condition. Ground turn speeds with the steering ratio selector in TAXI position shall be limited to 15 knots for turns not exceeding 20° of forward gear steering and shall not exceed 5 knots for turns requiring more than 20° of forward gear steering as indicated by the crosswind crab position indicator. Sharp turns and abrupt or hard braking are to be avoided whenever possible.

- During taxiing, both tip gears should be on or over maintained surfaces. Structural damage to the tip gear could be sustained while taxiing if the tip gear were permitted to run on rough terrain.

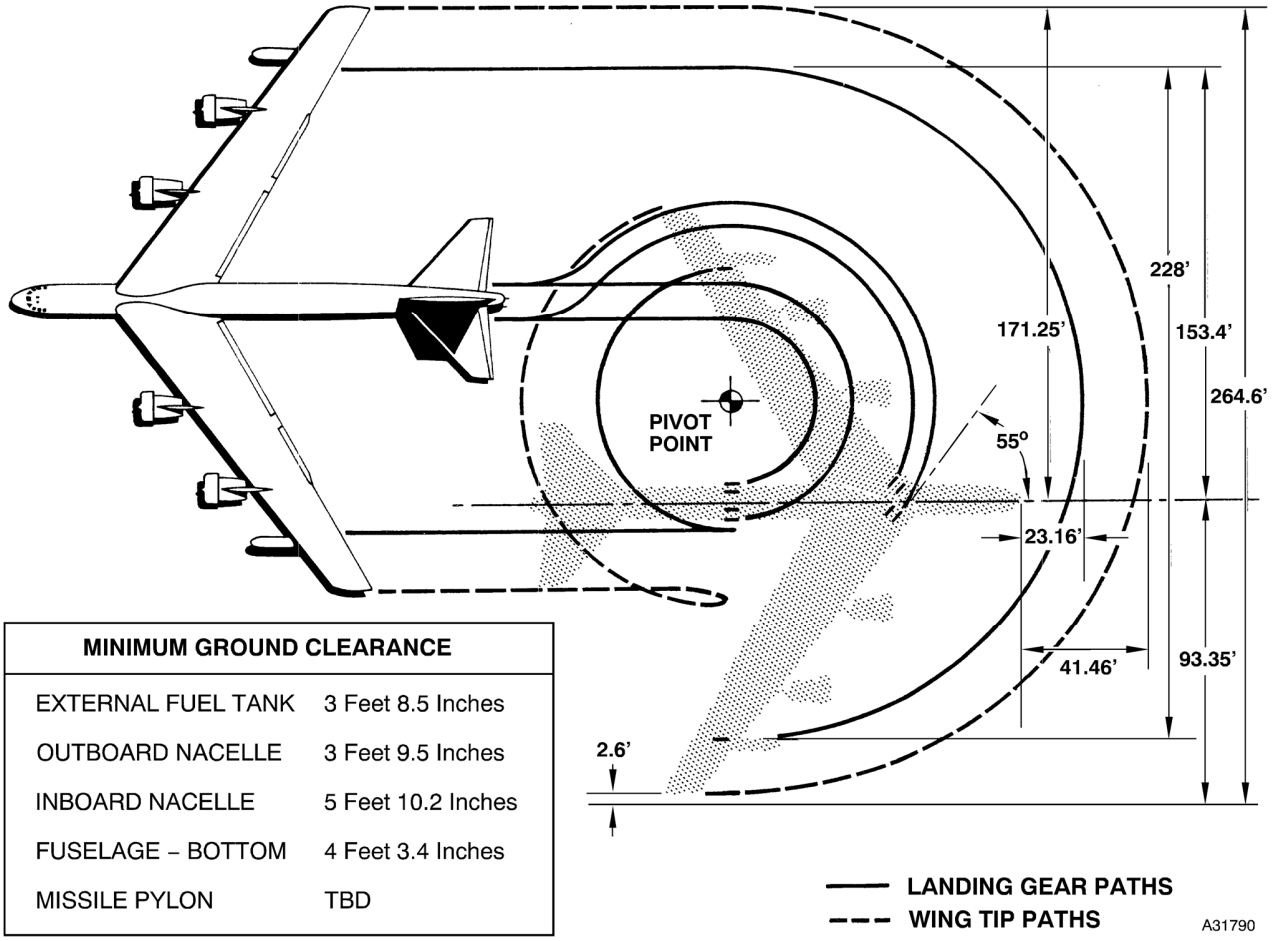
- One or both tip protection gear wheels may be in the trail-forward position (strut inboard) after having been reversed during a sharp turn on rearward towing. This is particularly true when wing and external tanks are full. An amber caution light marked TPG NOT IN TRAIL indicates this trail-forward condition. For a reversed right tip gear, introduce 20° nose left crosswind crab at a rate of approximately 2.5° per foot while moving forward at 2 or 3 knots until the gear casters. A minimum distance of 20 feet forward and 5 feet to the side is required for this procedure. If the gear does not caster, apply right steering, with the steering ratio selector in TAXI position, until the gear casters. Realign the aircraft with the runway by reverse steering. If necessary, use reverse crosswind crab to recenter the aircraft on the runway. For a reversed left tip gear, the above procedure should be followed using the opposite directions to those stated. If space does not permit use of this procedure, stop the aircraft and have the gear turned manually with the use of a turning bar.

COPILOT

The copilot will assist in maintaining a clearance of all obstacles during taxiing.

A31789

Turning Radius and Ground Clearance



MINIMUM GROUND CLEARANCE	
EXTERNAL FUEL TANK	3 Feet 8.5 Inches
OUTBOARD NACELLE	3 Feet 9.5 Inches
INBOARD NACELLE	5 Feet 10.2 Inches
FUSELAGE – BOTTOM	4 Feet 3.4 Inches
MISSILE PYLON	TBD

Figure 2-2

TAXIING AND BEFORE LINEUP CHECKLIST (Copilot/EW reads)

NOTE

- Only the **boldface** items need be accomplished for Scramble. All items will be reviewed during climb or as soon as practicable.
- The TAXIING AND BEFORE LINEUP checklist should not be performed while taxiing through a congested area.

1. BRAKES – CHECKED (P)

Check wheel brakes for proper operation as soon as possible after aircraft starts to move.

WARNING

If wheel shudder/brake chatter of a severe magnitude occurs during taxi operations, stop immediately and request maintenance assistance.

CAUTION

Do not attempt to use either steering or crosswind crab when aircraft is not rolling as severe loads would be applied to tires and landing gear.

2. FLAP LEVER – DOWN (CP)

Lower flaps after taxiing to ensure clearance from ground equipment by placing the flap lever in the down position..

3. TURN & SLIP INSTRUMENTS – CHECKED (P-CP)

Check heading indicators, magnetic compass and turn and slip indicator for proper movement during turns.

4. Crosswind Crab – Checked and down (P-CP)

If conditions permit, check operation of the crosswind crab to ensure positive response in both directions. Manually turn the crosswind crab knob in each direction, recentering the crosswind crab control with the centering button in each instance. Check both indicator needles for correct indication. If time/conditions do not permit system operation, check that the crab is centered and the knob is in the down position.

5. Pitot Heat – ON (P)

6. Control Surface Trim – Set (P-CP)

   Pilot and copilot check rudder and lateral trim for takeoff setting.

7. STABILIZER TRIM – CHECKED FOR TAKEOFF SETTING (P-CP)

WARNING

The pilot and copilot should use caution to preclude the possibility of inadvertent actuation of the stabilizer trim switch. Special care should be taken during takeoff, landing, and air refueling operations. In addition, the pilot not making the takeoff will monitor the stabilizer trim indicator during the takeoff roll.

NOTE

During flight, the stabilizer trim switch should be operated in short intermittent bursts to aid in recognizing a malfunctioning electrical trim system before reaching an extreme out-of-trim condition.

8. Airbrakes – OFF (P)

9. FLAPS – 100%, LEVER DOWN (P-CP)

   Pilot and copilot check wing flap indicators full down and wing flap lever in DN position.

10. Fuel Panel Switches – Set (CP); Checked (P)

    The pilot and copilot will set and check the fuel panel in accordance with one of the following sequences.

NOTE

- For JP-4 configured aircraft, see RECOCKING checklist, this section for proper fuel panel configuration.

a. 1 & 4 Above Green Band, Center & Aft Contains 2000 Pounds or More Each – 1, 2, 3, and 4 ON; 13 and 16 OPEN; 26 and 28 ENGINE FEED

b. Either Center or Aft Less Than 2000 Pounds Each – 1, 2, 3, and 4 ON; 9, 10, 11, 12 OPEN

TAXIING AND BEFORE LINEUP CHECKLIST (Copilot reads) (Cont)

11. WINDOWS & DOORS – CLOSED AND LOCKED (P-CP)

Check windows closed and hatches-not-locked light out.

12. Flight Instruments – Set (P-CP)

d. The pilot will announce the latest altimeter setting and the known elevation. The copilot and navigator will check their altimeters within 75 feet of the known elevation.

e. The pilot will announce his HSI and magnetic standby compass indications. The copilot and navigator will cross-check their instruments for errors.

f. Pilot positions the heading selector switch to MAN and checks bank steering bar for proper operation. The selector switch will be left in MAN during takeoff and the bank steering bar used to aid in directional control. Set the heading marker to runway heading with crosswind crab correction applied, i.e., if the crosswind crab correction is 10° left, the heading marker should be set 10' left of the runway heading.

NOTE

Cross-checking of bank steering bar, turn needle, and heading indicator will provide indication of attitude indicator failure in the roll axis. If the roll axis of the ADI is inoperative on takeoff, the bank steering bar will aid in maintaining a wings-level attitude until a new heading is selected.

g. Pilot and copilot set attitude indicators to level flight and check attitude indicator erected and OFF flag and ATT warning flag out of sight; standby attitude indicator erected and OFF flag out of view; heading indicators for movement in turns; and all pitot-static pressure instruments for correct indications.

WARNING

Any time during critical phases of flight and especially during night and/or instrument conditions, the pilot not flying the aircraft will closely monitor his flight instruments, and cross-check them against the instruments of the other pilot. If an apparent error in aircraft attitude is detected, the pilot flying the aircraft will be advised immediately.

13. Radar Altimeter – Set (as required) (P-CP)

Set 250 feet (Nav minimum bailout) when all crewmembers are in ejection seats. Set 500 feet for minimum bailout altitude when additional crewmembers not in ejection seats are on board.

14. Radio Navigation Instruments – Checked VOR/TACAN (P/CP)

When a certified ground checkpoint is available and time permits, the pilot not flying should check VOR/TACAN equipment within prescribed tolerances. Select the appropriate navigational aids to be used for the departure and set the navigational instruments and switches as required.

15. Air Conditioning Head Outlets – CLOSED (P-CP)

16. Generator Panel – Checked (CP)

    Copilot checks ammeters, frequency meter, and voltmeter.

17. STARTER SELECTOR – FLIGHT (CP)

18. TAKEOFF DATA – REVIEWED (P-CP)

Review EPR, thrust gate setting, S1 speed and time, and S2 speed. Procedures to be used in the event an emergency occurs during takeoff will be reviewed. Both pilots will have a complete under- standing of actions to be taken if an emergency occurs prior to or after S1 speed. The pilot/copilot will brief the crew to ensure that departure procedures are understood. This will include restrictions and hazardous terrain. Other crewmembers will report any deviations during the departure. Navigator will verify S_1 time during this review.

19. THRUST GATE – SET FOR TAKEOFF (CP)

Copilot will set the thrust gate according to the THRUST GATE SETTING FOR TAKEOFF chart

20. YAW & PITCH SAS – ENGAGE, LIGHTS OFF (P)

Place yaw and pitch SAS switches to ENGAGE. Check yaw and pitch SAS lights out and channel fail light out. Engagement of yaw and pitch SAS switches should normally be delayed until the aircraft is stationary just prior to takeoff in order to preclude possible maintenance problems.

21. Autopilot Power Switch – ON (P/CP)

22. SEAT, RUDDER PEDALS & CONTROL COLUMN – ADJUSTED AND CHECKED (P-CP)

Pilot and copilot adjust seat and check full displacement of control column and control wheel, then adjust rudder pedals to enable full displacement. Copilot holds column rigid near neutral while pilot applies push and pull forces on his column to confirm columns connected.

CAUTION

Do not attempt to check rudder pedal travel as severe loads would be applied to tires and landing gear.

TAKEOFF

Close attention will be given to the recommended procedures in order to obtain the most desirable takeoff performance. The normal takeoff technique is that which will be required to produce the results stated in the takeoff charts. These procedures have been selected as being the most desirable from the consideration of safety. The use of takeoff rated thrust will result in a minimum directional control speed above unstick speed under certain conditions. Other advantages to be gained by using this concept are the reduction in both the magnitude and the rate of trim changes required after takeoff, the reduction in the magnitude of the climb angle required after unstick to preclude exceeding flap placard, and the extension of airframe and engine life. The partial thrust procedure is used for all takeoffs unless the resultant minimum runway required exceeds 80% of the runway available.

CAUTION

- If it is absolutely necessary to fly the aircraft immediately following a heavily braked landing or reduced takeoff, a check of the BRAKE ENERGY LIMIT CHART (figure 5-14), should be made prior to takeoff.
- If a tire failure is suspected on takeoff before decision speed is reached, the takeoff should be discontinued. This is to preclude the possibility of landing gear failure caused by takeoff with a partially disintegrated tire.
- Following any extended takeoff roll, consideration must be given to delaying gear retraction to preclude retracting a gear which might develop extensive heat buildup and damage to the wheel well area. The delay in gear retraction should be a minimum of 15 minutes to allow for any possible heat dissipation. Care should be taken not to exceed limiting speed while gear are extended or during retraction.

TAKEOFF PERFORMANCE

Performance Data

All takeoff performance data should be determined prior to takeoff. This assures accurate planning and close monitoring of all takeoffs. These data include such items as takeoff gross weight, runway OAT, field length and altitude, wind direction and velocity, aircraft cg, and the runway gradient. From such items, it may be determined what the takeoff EPR and stabilizer setting are, what the crosswind crab setting is, and what the takeoff distance will be. A change in any one of these items will have an effect on takeoff performance as shown in figure 2-3. Relative humidity, which appreciably affects reciprocating engines, has a negligible effect on turbojet engines. An increase in takeoff distance not to exceed 100 feet will result from normal use of the engine stall prevention system up to 50 knots IAS.

Takeoff Planning

Adequate takeoff planning will always include the possibility of poor acceleration during the takeoff run. Although many factors may cause poor acceleration, the most probable cause is engine failure. If such a failure occurs, it will be possible either to stop in the runway distance remaining or to continue the takeoff safely on seven engines. The decision whether or not a stop can be made in the remaining runway will be made immediately and with the aid of predetermined criteria. The minimum runway required is the runway length required to accelerate to the decision speed, experience an engine failure, and then take off with seven engines. Minimum runway required charts are used to determine the maximum gross weight for a specific runway length. It should be pointed out, however, that climbout performance will be considered when determining the maximum gross weight for operation from a given runway. This is necessary because it is possible under certain runway pressure altitude and temperature conditions to load the aircraft so that, although the takeoff could be accomplished, very poor and sometimes unsafe climbout performance exists. This is discussed more fully under AFTER TAKEOFF, this section.

To determine the maximum takeoff weight, takeoff rated thrust will be used in the planning as follows: Enter the appropriate minimum runway required chart with the runway length available and arrive at a takeoff ground run. Entering the TAKEOFF GROUND RUN chart with this distance, arrive at a weight as determined by the existing field pressure altitude, temperature, and EPR for TRT. Check the climbout performance for this weight, temperature, and field pressure altitude by referring to the charts, keeping in mind terrain clearance, flap retraction problems, and engine failure possibility. Once this weight has been determined, the only other information re- quired is that which will enable the pilot to properly monitor the takeoff. These are the decision time and speed and the takeoff speed.

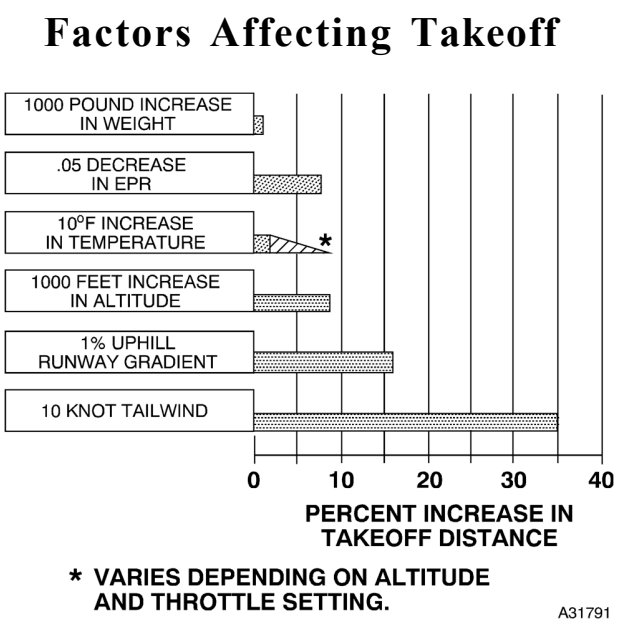


Figure 2-3

S_1 S_2 Acceleration Monitor System

The S_1 S_2 acceleration monitor system is based on a timed acceleration check between two indicated airspeeds which can be compared against a precomputed acceleration rate taken from charted values prior to takeoff. Use of this system virtually eliminates wind error, airspeed indicator calibration error is minimized, and no reference point outside of the aircraft is necessary. The S_1 S_2 system checks acceleration only after thrust is set which increases accuracy during rolling takeoffs. Use of engine stall prevention system must be discontinued at 50(±5) knots for the S_1 S_2 acceleration check to be valid. Excellent crew coordination is essential when using the S_1 S_2 acceleration check.

NOTE

When a computed takeoff distance is 4000 feet or less, the S_1 S_2 takeoff procedure will not be used. In lieu of timing acceleration, a check of all engine instruments will be made when 70 knots is reached during the takeoff roll. At this point, the decision will be made to continue or abort the takeoff, except the takeoff may be aborted at any time prior to unstick when the aircraft gross weight is 250,000 pounds or less and the runway is dry.

INITIAL TIMING SPEED

Initial timing speed is the speed (70 knots IAS) at which timing is started to determine acceleration characteristics of the aircraft.

S_1. S_1 is the computed decision speed (S_1 speed) which must be reached by the termination of the acceleration check time (S_1 time). S_1 speed does not commit the aircraft to takeoff. The end of S_1 timing will determine the decision to take off (committed) or abort (ABORT).

S_2. S_2 is the takeoff indicated airspeed (unstick speed).

Engine Thrust

Takeoff thrust is reduced with an increase in outside air temperature and/or field elevation; however, good takeoff performance is obtainable at high temperatures and high field elevations. The turbofan engine is a “part throttle” engine in that takeoff rated thrust is developed with less than full throttle travel at all temperatures below approximately 100°F. At the beginning of the takeoff while at low airspeed, the throttles are positioned to obtain a computed EPR reading on the EPR gages. This value is calculated for the prevailing ambient conditions. Under certain conditions, the thrust developed will be less than takeoff rated thrust when using the computed partial thrust EPR values. With throttles set in this position, any change in EPR due to ram effect, as the airspeed increases during takeoff, is normal and no further adjustment is ordinarily required.

TAKEOFF PROCEDURES

Correct takeoff procedures may vary under different takeoff conditions. There are, however, some procedures which are standard for every takeoff. These procedures, which are discussed in ALL TAKEOFFS, should always be adhered to. For the takeoff calculations and a summary of the takeoff procedures.

All Takeoffs

The charted EPR and stabilizer trim setting will be used for all takeoffs except touch-and-go and taxiback. The wing flaps will be set for 100% down and intermediate settings will never be used.

ROLLING TAKEOFF

In order to minimize the fatigue damage effects to the wing structure, all takeoffs will normally be made from a rolling start. In those situations when safety may be compromised by performing a rolling takeoff or when runway conditions dictate, takeoff may be made from a braked condition. However, maximum thrust operation with brakes locked will be kept to a minimum. When making a rolling takeoff, the aircraft will be aligned with the runway at normal taxi speeds using the radius guidelines.

CAUTION

The maximum turn-on groundspeed for a 140 to 150 foot turn radius is 15 knots. This limit is based on aircraft strength and will not be exceeded.

Steering ratio selector may be placed in TAKEOFF LAND after completion of the BEFORE LINEUP checklist if the runway turn radius permits. Not permitting, it will be placed in TAKEOFF LAND when aligned with the runway. Power will never be advanced to TAKEOFF until within 15° of runway heading.

THROTTLES

The thrust gate is used for initial positioning of throttles for takeoff. The thrust gate setting is obtained from the takeoff data card; the card entry is made at the time of takeoff planning. The pilot flying the aircraft will advance the throttles deliberately and evenly to the thrust gate. Initial reference to the EPR is not necessary. Full throttle movement should be made in a minimum of two seconds to avoid compressor stalls and a maximum of four seconds to stay within computed takeoff data parameters. As soon as the throttles are against the thrust gate, and stabilized for approximately two seconds, the pilot not flying will adjust the throttles to the proper engine pressure ratio (EPR) as quickly as possible. If any engine fails to achieve the charted EPR setting, the throttle for that engine may be advanced through the thrust gate as necessary to set the charted EPR. Pilots should not advance throttles that have already achieved the charted EPR setting. No attempt will be made to steer by throttles as differential thrust is ineffective and reduction of thrust on one side will increase the takeoff ground run. The pilot fly- ing the aircraft will maintain throttle control until the expiration of S_1 timing and the decision has been made to continue the takeoff (committed). He will maintain throttle control throughout light gross weight takeoffs (computed takeoff distance 4000 feet or less), touch-and-go, or taxi-backs to in- clude climb through flap retraction (if applicable).

STABILIZER TRIM

The stabilizer trim setting required for the takeoff depends on the center of gravity location, aircraft gross weight and EPR for takeoff.

WARNING

Failure to set the stabilizer correctly could result in:

1. An accelerated stall if the stabilizer trim is set too noseup.
2. Longer than predicted takeoff ground runs if the stabilizer trim is set too nosedown.

WING FLAPS

The wing flaps are so designed that the highest lift-drag ratio is achieved at the 100% down position. For this reason, they are always used in this position. Because wing flap extension time is 60 seconds and intermediate settings are ineffective, the lowering of flaps during the takeoff roll is not rec- ommended.

CONTROL TECHNIQUE

Steering should be accomplished with the rudder pedals throughout the ground run. The steering system will be effective until sufficient speed is established for rudder control. The takeoff will require a pull force on the control column approximately 5 to 10 knots prior to unstick speed. The control column will be pulled back as required to achieve the computed unstick speed. At the appropriate speed, the forward wheels will come off the runway first and the aircraft will tend to rotate about the rear wheels. Relaxing back pressure at the time the aircraft leaves the ground will stop this pitching action. However, if the stabilizer trim is set too high (aircraft nose up) the control column must be pushed well forward to stop the pitching action. Should rearward control column movement be delayed until just before the takeoff point, the takeoff ground run may be increased as much as 5%.

Heavy Gross Weight Takeoff

The takeoff and initial portion of the climbout are the critical conditions for an aircraft weighing 450,000 to 488,000 pounds. When takeoff is planned at these weights, performance calculations should be gone over thoroughly not only for normal operation but for emergency conditions as well. A positive vertical velocity cannot always be maintained during the complete flap retraction cycle; therefore, at these heavy weights, flap retraction will normally be delayed until reaching 1500 feet. After takeoff, there is ample climb performance. Even with one engine out, the aircraft is well above the outboard engine-out minimum control speed.

Light Gross Weight Takeoff

When the computed takeoff distance is 4000 feet or less, the takeoff will be considered a lightweight takeoff. When takeoff is made at light weight, the airspeed and rate of climb increase rapidly after unstick. This condition reduces the time during which trim changes can be made. The pilot should control any noseup rotation with forward control column and nosedown trim and check for proper movement of the manual trim wheel. After the landing gear is retracted, the thrust should be adjusted during climb to flap retraction altitude to produce a rate of climb of approximately 1500 to 2000 feet per minute.

NOTE

Avoid rapid adjustments in thrust level. Anticipate changes sufficiently far in advance to provide time for change in trim.

When partial thrust is used for takeoff, the above problems are minimized and thrust may not have to be adjusted during climb to flap retraction alti- tude.

Instrument Takeoff and Initial Climb

An instrument takeoff is essentially the same as a normal VFR takeoff. Ensure the attitude indicator is set for takeoff by aligning the horizon bar with the miniature aircraft.

1. Align the aircraft visually with the runway. The copilot will visually monitor the takeoff and initial climb. A takeoff with reference to instruments exclusively may be required because of low visibility conditions.

NOTE

The bank steering bar will be used during the takeoff and climb as an aid in heading control. Cross-checking of the bank steering bar, turn needle, and heading indicator will provide indication of attitude indicator failure in the roll axis. If the roll axis of the ADI is inoperative on takeoff, the bank steering bar will aid in maintaining a wings-level attitude until a new heading is selected. This type of failure has occurred several times without a warning flag in view. If a new heading is selected, then the roll axis failure should become apparent as the turn is initiated. A rapidly precessing heading indicator will also give the same in- dications.

2. As the aircraft breaks ground, maintain the unstick attitude as indicated by the attitude indicator until a cross-check of vertical velocity indicator and altimeter indicate a definite rate of climb with increasing airspeed.

WARNING

- If a pitchup occurs as the aircraft becomes airborne, failure to initiate positive action with the elevator control and trim to stop the aircraft noseup rotation could result in a stall.

- The OFF flag will not appear during every attitude indicator failure. Therefore, it is possible that a malfunction of the attitude indicator might be determined only by cross-checking it with the turn and slip in- dicator and the other flight instruments.

NOTE

- The ATT warning flag indicates the attitude information displayed on the pilot and/or copilot attitude director indicator may be erroneous and the standby attitude indicator should be checked to determine proper attitude references.

- An error in the pitch indication of the attitude indicators is generated during accelerations or decelerations. The error is indicated in a nose-high direction during and after a forward acceleration and a nose-down direction during and after deceleration. The longer the duration of acceleration (or deceleration), the greater will be the indicated error and the longer it will persist when acceleration (or deceleration) ceases. The erection system reduces the error at about the same rate as it was generated. Pitch error may reach one bar width during a high gross weight takeoff.

3. Retract the gear as recommended for a VFR takeoff; however, be certain that a safe stabilized climb has been established. Adjust pitch as necessary to maintain a climb at 180 knots IAS.

4. Retract flaps as recommended for a VFR takeoff.

Night Takeoff

When making a night takeoff, use the same procedure as for a day takeoff. If the pilot wishes to energize the fluorescent dials on his instruments so that they glow with maximum intensity, the white spotlight may be used for focusing on the applicable instruments for a few seconds while the pilot's eyes are covered. The landing lights, terrain clearance light, and crosswind landing light may be used at the pilot's discretion.

NOTE

The landing lights are in the leading edge of the forward landing gear doors and will remain on until the landing gear is up and locked or until switch is turned OFF.

Crosswind Takeoff

NOTE

- Sustained runway wind velocity plus 1/3 of the gust factor will be used to compute crosswind crab settings for a takeoff with gusty wind conditions.

- If a crosswind cannot be compensated for by use of the crosswind crab system, a takeoff is not recommended.

- If the wind is a variable wind, the average heading of this variable wind should be used.

Prior to the time of takeoff, the takeoff weight and local field wind velocity and direction should be ascertained and the crosswind crab setting determined for these conditions. While taxiing to takeoff position, set the crosswind crab control knob in the direction the nose of the aircraft is to be crabbed into the wind. Taxi into takeoff position so that the nose of the air- craft is pointing into the direction of the wind com- ponent (figure 2-4). The miniature aircraft and pointer on the crosswind crab indicator should point to the degree setting corresponding to the crab angle previously determined for the wind and gross weight. The miniature aircraft and pointer should be crabbed across the simulated runway on the indicator in the same direction that the aircraft is crabbed across the runway on the takeoff.

ENGINE OPERATION

During a crosswind takeoff, the turbofan engine is susceptible to engine stall under certain conditions and requires use of the engine stall prevention system. The engine stall prevention system will be used when the runway wind velocity is 10 knots or more and the wind direction is 45° or more to the runway heading. When the aircraft reaches a speed of 50 knots IAS, the engine inlet airflow distortion is reduced and use of the system is discontinued. Use of this system results in a change EPR and thrust output of the engine. An EPR drop of approximately 0.1 will occur when the engine stall prevention switch is depressed with engines operating near TRT and a drop of approximately 0.05 when operating at lower thrust settings. An EPR jump of the same magnitude will occur when the engine stall prevention switch is released at the 50 knot point. Normal use of the engine stall prevention switch for a crosswind takeoff is as follows: During the turn on the runway, the engine stall prevention switch is depressed and held prior to advancing throttles above 1.3 EPR. The throttles are advanced to the takeoff EPR adjusted for the drop due to engine stall prevention switch use. After an indicated airspeed of 50 (±5) knots is reached, the engine stall prevention switch is released and an EPR jump is observed.

Crosswind Crab Operation

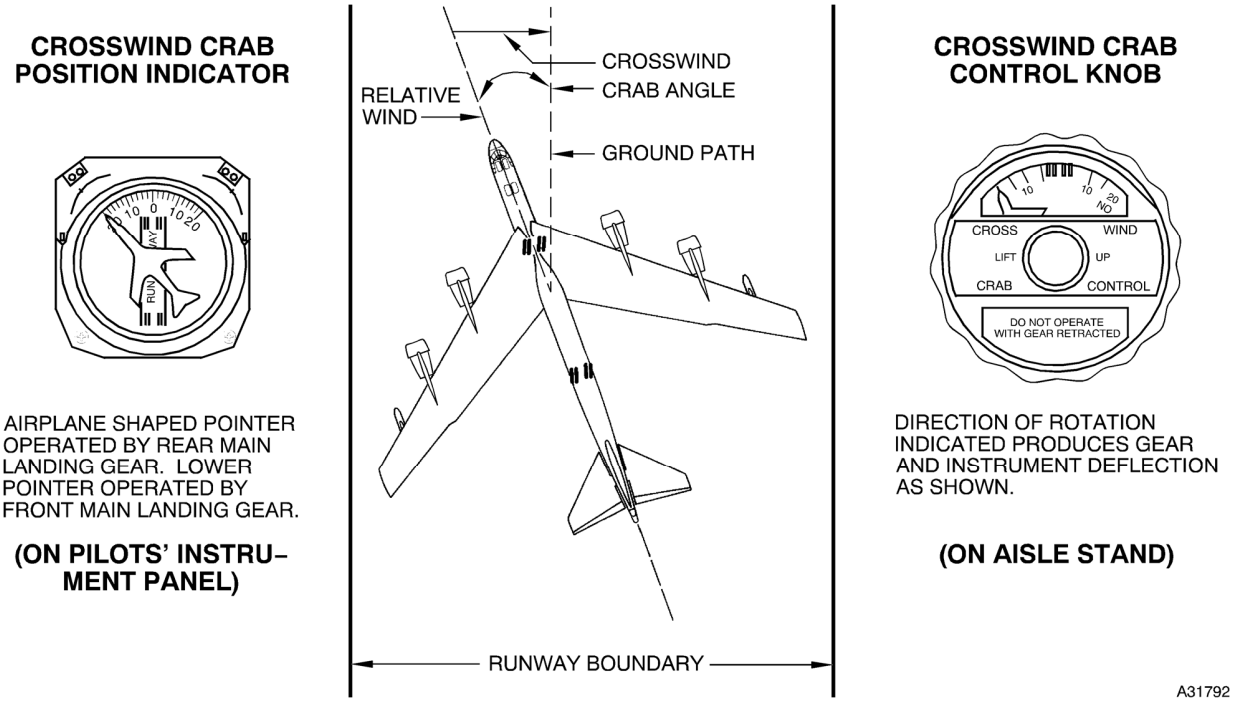


Figure 2-4

CONTROL TECHNIQUE

The takeoff procedure used is the same as that for a normal takeoff except that the aircraft will be crabbed into the wind, a condition which may seem strange the first few times a pilot uses this crosswind crab technique. Engine thrust may pull the aircraft toward the side of the runway from which the wind is blowing before the aircraft becomes airborne. This effect is easily overcome by use of the proper amount of rudder pedal steering. If the crosswind is of a large enough magnitude, it may cause the aircraft to heel over on the downwind tip gear at low speeds. Such a differential tip gear loading can cause high stresses in the tip gear tire as speed increases. An attempt to level the wings with lateral control can be initiated when passing through 60 knots IAS on the takeoff roll, but full control wheel travel may be necessary at this airspeed. A slight increase in the ground roll of not more than 1% can be anticipated because of the drag imposed by the raised spoilers. The lateral control required to maintain a wings-level attitude will diminish as the airspeed increases to the take- off speed if the crab angle setting being used was determined for the correct wind and gross weight. Forward gear steering becomes less effective as the wheels become lightly loaded; however, the rudder control becomes more effective and compensates for the decrease in effectiveness of forward gear steering.

LANDING GEAR RETRACTION

After the aircraft is airborne and brakes have been applied, retract the landing gear. The crosswind crab control knob and indicator will be automatically centered prior to the time the gear retracts.

CAUTION

Following any extended takeoff roll, consideration must be given to delaying gear retraction to preclude retracting a gear which might develop extensive heat buildup and damage to the wheel well area. The delay in gear retraction should be a minimum of 15 minutes to allow for any possible heat dissipation. Care should be taken not to exceed limiting speed while gear are extended or during retraction.

NOTE

During landing gear retraction, the landing gear may hesitate momentarily in the retraction cycle if large amounts of stabilizer trim are applied. This is considered normal and is due to the design of the hydraulic system which gives the demands of the stabilizer system priority over the retraction cycle demands of the landing gear system.

Obstacle Clearance Takeoff

If obstacle clearance is marginal, retract the landing gear as soon as possible after becoming airborne, leave wing flaps fully extended, and climb at 10 knots above takeoff speed until the obstacle is cleared. The charts show the distance required from point of brake re- lease to clear a 50 foot obstacle with seven and eight engines. Since an engine failure may be en- countered after S_1, it is recommended that the charts be entered using the seven engine ground run distance. After the climb from C to F (figure 2-6), allow the aircraft to accelerate to 180 knots indicated airspeed and continue climb to at least 1000 feet above the terrain before starting flap retraction.

.

TAKEOFF CHECKLIST

NOTE

This checklist will be reviewed prior to takeoff and need not be read during takeoff.

1. IFF – NORM (P)

   Pilot will check that proper mode and code settings are set prior to selecting NORM on the IFF system.

2. Lights – ON (P/CP)

   Turn landing, taxi, and crosswind landing lights on for day or night operations unless the reflection reduces pilot visibility.

3. Crosswind Crab – Set, knob down (P-CP)

   The pilot not making the takeoff will set the crosswind crab while taxiing to takeoff position. The pilot making the takeoff will check the indicator for proper setting.

4. Air Conditioning – RAM (P/CP)

5. ESP Switch – Climatic (if used, release at 50 knots) (P)

   When making a crosswind takeoff requiring use of the engine stall prevention switch, the pilot will depress and hold the engine stall prevention switch during the turn onto the runway and prior to reaching 1.3 EPR.

6. Steering Ratio – TAKEOFF LAND (P)

   Steering ratio selector may be placed in TAKEOFF LAND after completion of the TAXIING AND BEFORE LINEUP checklist if the runway turn radius permits. Not permitting, it will be placed in TAKEOFF LAND when aligned with the runway.

WARNING

If the steering ratio lever is not in TAKEOFF LAND, the landing gear cannot be retracted.

CAUTION

Center the rudder pedals before repositioning the steering ratio selector lever. Actuation of the lever when the rudder pedals are deflected is very difficult and will result in a sudden change in steering angle.

TAKEOFF CHECKLIST (Cont)

7. Throttles – Set (P-CP)

Pilot team will advance all throttles to applicable EPR setting when the aircraft heading is within 15° of runway heading. Manifold temperature should not exceed 246°C.

WARNING

If the warning horn sounds and the master caution lights come on as throttles are advanced beyond approximately 45° from CLOSED, the flaps should be rechecked at 100% down.

CAUTION

- Extended operation of the engines at full thrust reduces wing trailing edge service life. Wing flap service life is also adversely affected, especially with flaps down. Do not operate in this condition any longer than necessary.

- Exceeding takeoff rated thrust and/or charted takeoff EPR values can cause structural damage to the engine causing rapid engine deterioration.

NOTE

- When making a takeoff from a standing start, pilots should be alert for possible aircraft movement when throttles are advanced since the parking brakes were not designed to hold the aircraft with all engines at NRT. If movement is detected, depressing the brakes beyond parking brake position may reduce the creeping but may not stop it. If takeoff is not imminent, reduce thrust to stop the aircraft.

- If the ESP switch is used, adjust EPR to computed takeoff value minus the ESP correction factor.

- During initial takeoff roll, the copilot will check oil pressure (and the low oil pressure warning lights), EPR, rpm, and EGT indicators within limits and will monitor engine instruments during remainder of takeoff roll.

- Copilot monitors the stabilizer trim indicator during the takeoff roll in order to detect any inadvertent change in takeoff trim setting.

TAKEOFF CHECKLIST (Cont)

8. 70 Knots – Now (P)

   Pilot announces over interphone "70 knots" at approximately 60 knots. At 70 knots, pilot announces "Now." As pilot announces "Now," the navigator starts his stopwatch. Radar navigator backs up navigator's timing on all takeoffs. If the navigator is not aboard, the radar navigator accomplishes the time check. Copilot checks his airspeed indicator at the 70 knot check. Airspeed indicators will be written up in Form 781 if difference exceeds 3 knots. Takeoff will be aborted if difference exceeds 6 knots.

   NOTE

   Crosswinds or wind gusts will affect airspeed indicators. Fluctuations of both indicators can be observed (not necessarily in the same direction) and should be considered during cross-check.

9. Acceleration Timing – Checked (N) (RN Backup)

   Navigator announces over interphone "Coming up on _____ seconds" approximately 3 seconds prior to S_1 time. At S_1 time, navigator announces "Now." At the same time, the pilot checks his airspeed and announces to the crew his decision to take off ("Committed") or abort ("Abort"), based on the time-speed relationship. Pilot not flying the aircraft will take control of the throttles and set the throttle brake. (radar navigator backs up navigator's timing on all takeoffs.)

   WARNING

   Takeoff will not be aborted after S_1 unless, in the opinion of the pilot, the emergency renders the aircraft definitely unsafe to attain emergency bailout altitude. In those cases where the pilot attempts to abort after S_1, he must accept the fact that he will probably fail to stop within the confines of the runway.

10. Unstick Speed (S_2) – Now (CP)

    Copilot calls over interphone "unstick speed" approximately 5 to 10 knots before reaching unstick speed. At unstick speed, copilot announces over interphone "Now."

AFTER TAKEOFF

CLIMBOUT PLANNING

Under some operating conditions, climbout can be the most critical phase of aircraft operation. For this reason, it is essential that the climbout technique be planned during mission planning prior to the flight. The climbout procedures essentially fall into two categories which are explained in the fol- lowing paragraphs. These are a normal climbout and an obstacle clearance climbout.

The partial thrust takeoff procedures can be used, the rate of climb will al- ways exceed 1500 fpm and no check will be necessary. If an obstacle will be cleared, the obstacle clearance climbout procedure will be used.

AFTER TAKEOFF PROCEDURES

After leaving the ground, the wheel brakes will be applied before starting gear retraction to avoid wheel well damage from spinning wheels. The landing gear retraction should be started as soon after unstick as possible. If at a light gross weight when climb is started, the power should be adjusted during climb to flap retraction altitude to a setting which will produce a positive vertical velocity of approximately 1500 to 2000 feet per minute. When partial thrust takeoff procedures are used, the throttles may not have to be adjusted to obtain this desired rate of climb. Keep aircraft trimmed as close as possible to zero stick force in the climb.

Stabilizer Trim Use After Takeoff

The period from takeoff to flaps up requires active stabilizer trim use by the pilot to meet the rapidly changing trim requirements. Stabilizer trim should be utilized as required to maintain stick forces near zero to preclude the rapid development of an out-of-trim condition. Stick forces associated with flaps down are very light even full travel of the control column and can lead to the false impression that stabilizer trim is not required.

NOTE

Control column force is a function only for control column position and airspeed; this force is not dependent on stabilizer position. If the control column is at full travel and stabilizer trim is being used, no change in control column force will occur until the control column is repositioned by the pilot. A positive method of determining whether or not the trim is working is to note the ac- tion of the trim wheel.

Excessive force is not required to position the control column at full travel in the flaps-down configuration. Therefore, if a condition develops in which the pilot is holding the control column hard against the stops and not effecting positive control of the aircraft, he will make a conscious effort to utilize stabilizer trim. If this condition has developed and trimming action has been started, the response of the aircraft may not be immediately apparent. Continue trimming until control is regained.

A typical profile of trim requirements is given in figure 2-5. When the aircraft is out of ground effect, landing gear is retracted and the aircraft is accelerated to 180 knots IAS, a nosedown stabilizer trim requirement of approximately 3 units exists. During the first 80% of flap retraction, approximately 1.4 units of stabilizer noseup trim is needed. An additional 1.1 units of noseup trim is required during the last 20% of flap retraction. For these trim requirements, the manual trim wheel is too slow to maintain zero stick force; therefore, the stabilizer trim button should be used. During flap retraction, stick forces are light and a few seconds of holding a rearward control column rather than retrimming can result in an aircraft out-of-trim condition of 2 or 3 units nosedown trim and an approaching loss of elevator authority. Application of noseup trim and full-up elevator will result in immediate recovery.

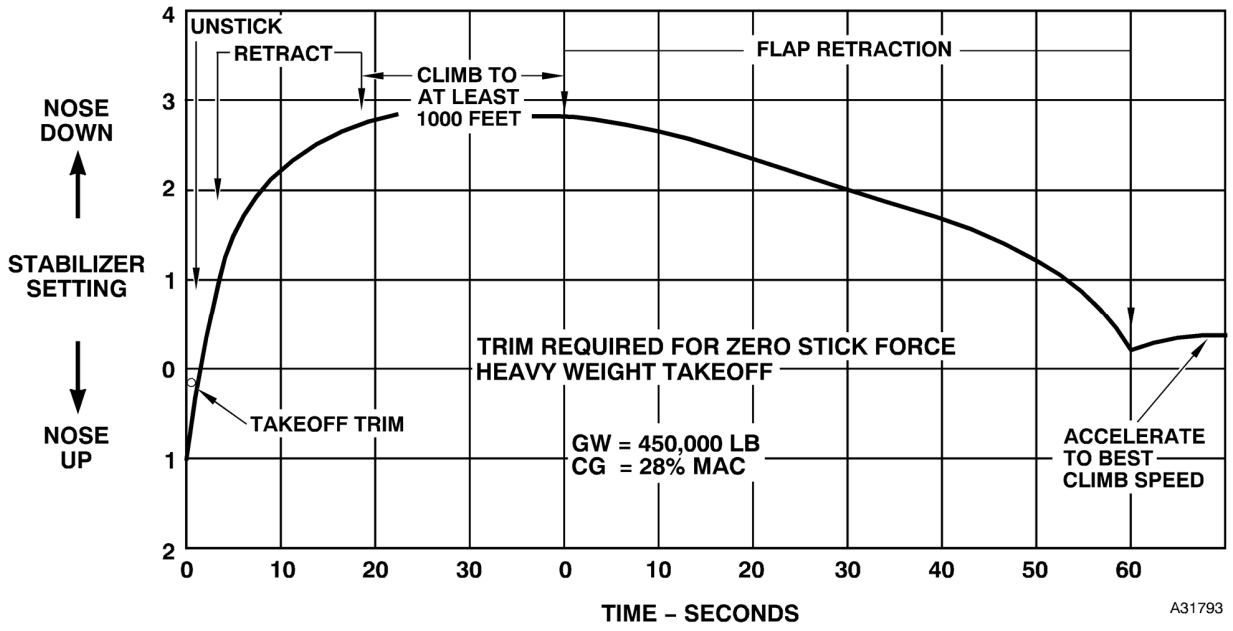


Figure 2-5

After the flaps are fully retracted, nosedown trim change will be required during acceleration to best climb speed.

WARNING

- When holding full up elevator, the pilot will be certain that he is engaging the trim button in NOSEUP position. Due to the position of the control column, he may be pushing in on the button or down on the trim button guard.

- Since during initial climb phase a severe attitude change occurs requiring considerable manipulation of the stabilizer trim, pilots should be especially alert for a stabilizer trim malfunction during this critical phase of flight, and initiate immediate action as outlined in FLIGHT CONTROL SYSTEM EMERGENCY OPERATION

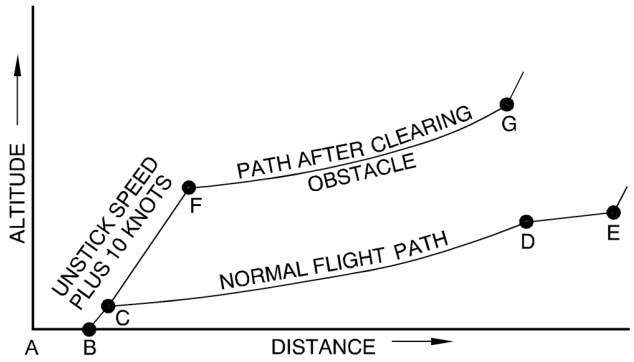
Normal Climbout Procedure

After unstick, the aircraft is accelerated to 180 knots IAS and a flaps-down climbout made to at least 1000 feet above the terrain (path CD in figure 2-6). At this point, flap retraction will be initiated. The aircraft will be accelerated on takeoff heading during flap retraction whenever possible. The air- speed will be maintained above the minimum rec- ommended with flaps up.

Obstacle Clearance Climbout Procedure

When obstacles near the field will be cleared on takeoff, the climbout performance becomes very important. A high angle of climb for clearing close obstacles is maintained by leaving the flaps down and climbing at 10 knots above unstick speed until obstacle is cleared.

After Takeoff Flight Paths



POINT A.	Start takeoff roll using takeoff rated thrust (TRT) with wing flaps down.
POINT B.	Takeoff point; start gear retraction.
PATH CD.	Leave flaps down and climb out at 180 knots IAS to 1000 or 1500 feet above the terrain.
POINT D.	Start flap retraction at 1000 or 1500 feet altitude above the terrain.
PATH CF.	Leave flaps extended and climb at unstick speed plus 10 knots until the obstacle is cleared.
POINT F.	Maximum desired altitude for clearing obstacle (at least 1000 feet above terrain).
PATH FG.	Start flap retraction at 180 knots IAS; maintain a rate of climb sufficient to keep from exceeding flap placard limits.
POINTS E	Points at which flaps are up. Accelerate

Figure 2-6

Flap Retraction Precautions

During flap retraction, the speed schedule shown in figure 2-7 should be maintained within ±10 knots. This schedule gives a safe margin between flap placard and minimum speeds. If the airspeed is low, the vertical velocity should be reduced or power added. During the flap retraction cycle, it is required that the pilot monitor the aircraft attitude as closely as possible, keeping the aircraft trimmed to a zero stick force, especially during the last 20% of flap retraction. If the climbout has been properly planned and no emergency develops, a satisfactory vertical velocity can be maintained while accelerating during flap retraction. However, under conditions of high gross weight, high OAT, and high field elevation, or any combination of these factors, it may be impossible to maintain a positive vertical velocity during the latter part of the flap retraction period. Flaps must not be retracted in a turn. The speed schedule of 180 knots IAS at 100% flaps down, 200 knots IAS – flaps 50%, 210 knots IAS – flaps 30%, and 230 knots IAS – flaps full up should be followed. In any event, maintain a sufficient positive vertical velocity to keep from exceeding the flap placard speed of 225 knots IAS at the 50% position and 253 knots IAS at the 10% position. If a turn is required during flap retraction, stop the flaps before making the turn and limit the angle of bank to 20 degrees. Maintain the speed appropriate for the flap position during the turn. After completion of the turn and in a wings level attitude, resume flap retraction.

WARNING

The OFF flag will not appear during every attitude indication failure. Therefore, it is possible that malfunction of the attitude indicator portion of the attitude-director indicator might be determined only by cross-checking it with the turn and slip indicator

and the other remaining flight instruments.

NOTE

- The ATT warning flag indicates the attitude information displayed on the pilot and/or copilot attitude direction indicator may be erroneous and the standby attitude indicator should be checked to determine proper attitude references.

- An error in the pitch indication of the attitude indicators is generated during accelerations or decelerations. The error is indicated in a nose-high direction during and after a forward acceleration and in a nose-down direction during and after deceleration. The longer the duration of acceleration (or deceleration), the greater will be the indicated error and the longer it will persist when acceleration (or deceleration) ceases. The erection system will reduce the error at about the same rate it was generated. Pitch error may reach one bar width during a high gross weight takeoff.

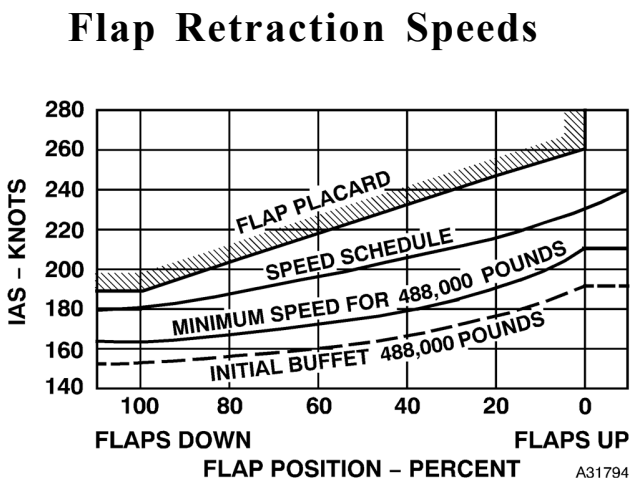


Figure 2-7

Heavyweight Flap Retraction Performance

It can be seen from figure 2-8 that on a heavy- weight takeoff, the flap retraction performance of this aircraft is not critical. With one engine out at 100°F, the vertical velocity indicator will indicate a rate of descent of approximately 50 feet per minute for so short a period of time that the actual altitude loss will be negligible.

Instrument Flight Procedures

The procedures and techniques outlined in current instrument flying directives should be followed. Flight characteristics during instrument conditions do not differ from those encountered during visual flight conditions. Limit angle of bank to 30° for all normal instrument maneuvers.

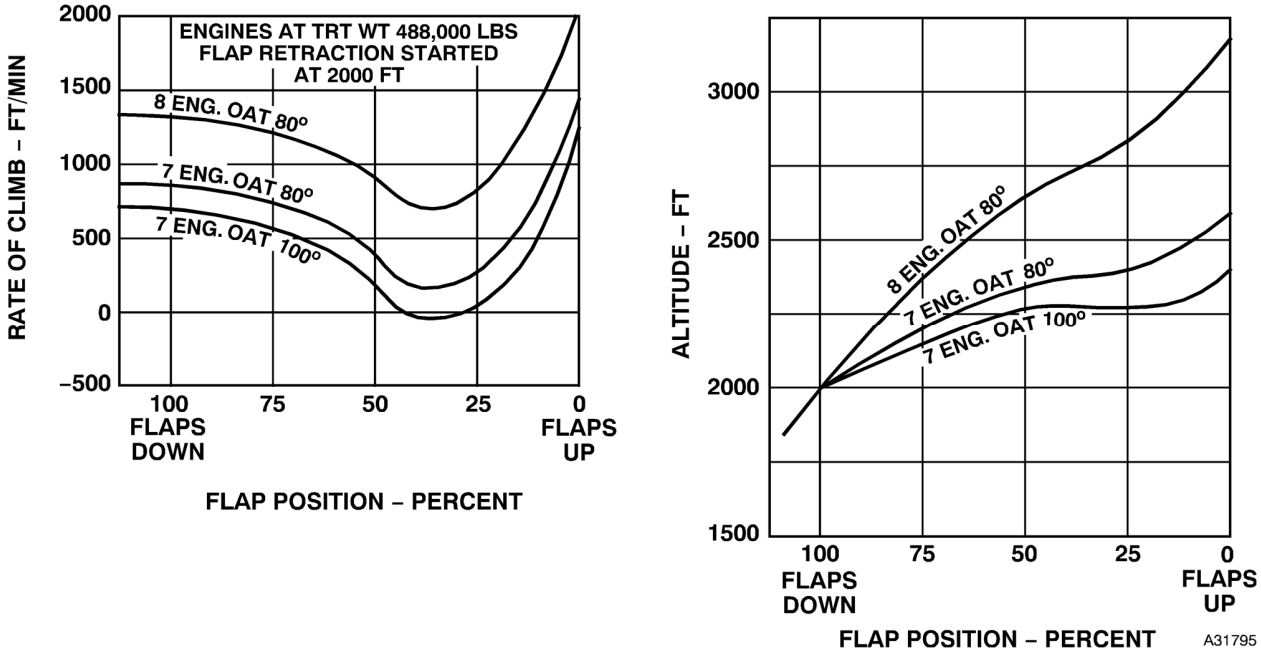


Figure 2-8

AFTER TAKEOFF – CLIMB CHECKLIST

1. Landing Gear – UP (P-CP)

   Pilot making the takeoff will apply wheel brakes firmly for approximately 3 seconds and then call for gear up; the landing gear lever will then be moved to the GEAR UP detent position. Under winter weather, slush and wet runway conditions, leave the landing gear down approximately 30 seconds prior to wheel brake application, to allow moisture to be blown from the landing gear. After gear retraction, the pilot not making the takeoff will ensure the warning light is out, and that all six gears indicate up and locked. The pilot not flying will then announce "UP". The pilot flying will acknowledge the call by replying "UP".

   CAUTION

   - If any gear fails to indicate up and locked, to prevent system damage, do not recycle the landing gear system prior to initiating abnormal procedure.
   - Following any extended takeoff roll, consideration must be given to delaying gear retraction to preclude retracting a gear which might develop extensive heat buildup and damage to the wheel well area. The delay in gear retraction should be a minimum of 15 minutes to allow for any possible heat dissipation. Care should be taken not to exceed limiting speed while gear are extended or during retraction.

2. Flaps – UP and OFF (P-CP)

   At 180 knots IAS, 1000 fpm vertical velocity, and a minimum altitude of 1000 feet AGL, the pilot making the takeoff calls for flaps up; the flap lever will then be moved to the UP position. If a 1000 fpm vertical velocity is not attained when reaching 1000 feet AGL, flap retraction will be delayed until 1500 feet AGL is reached. At the appropriate time, the pilot not making the takeoff advises, "FLAPS coming up, flaps 50%, flaps 30%, and flaps UP & OFF". As a guide, the normal speed schedule during flap retraction should be 180 knots IAS at 100%, 200 knots IAS at 50%, 210 knots IAS at 30%, and 230 knots IAS when flaps reach the full-up position. If the actual IAS varies from these values by 10 knots or more, the pilot not making the takeoff will advise the pilot flying so he can make the necessary pitch corrections. When the flaps are full up, move the flap lever to OFF to prevent flap motor damage which may be caused by limit switch actuation after flap retraction.

   WARNING

   - During last 20% of flap retraction, maintain zero stick force using the stabilizer trim button. In event of adverse nosedown pitching tendency, airbrakes may be used to correct to a normal noseup condition.
   - Any unusual rolling moment encountered during flap operation could indicate an asymmetrical flap condition for which corrective action will be taken immediately. (A discussion of flight characteristics with asymmetrical flaps is included in Section III.)
   - If thrust is reduced during initial climb, it may be necessary to add thrust during flap retraction to maintain the desired speed schedule and to preclude loss of altitude.

   CAUTION

   If flaps fail to start moving within 10 seconds, wing flap operation should be discontinued to prevent damage to the flap drive system. See WING FLAP LIMITATIONS

AFTER TAKEOFF – CLIMB CHECKLIST (Cont)

3. Throttles – Set (P/CP)

   An MRT or NRT climb at a specific airspeed or Mach number is accomplished by adjusting to the EPR tabulated in the appropriate abbreviated checklist chart for the correct altitude and cockpit OAT gage reading. Computation may be accomplished by the navigator when aboard. EPR settings can also be obtained from the THRUST SETTING chart. It is necessary to recheck the EPR setting by one of the above methods approximately every 10,000 feet during the climb to ensure that MRT and NRT are not being exceeded. For practical purposes, this check can be made at the 12,000 feet oxygen check and every 10,000 feet thereafter.

   CAUTION

   Due to characteristics of the engine, it is important to set MRT and NRT by use of EPR. EGT is not to be used as a means of setting climb thrust.

   NOTE

   - NRT will normally be used for all climbs. MRT may be used for emergency conditions or as mission requirements dictate.
   - If normal rated thrust power setting produces a rate of climb greater than 4,000 feet per minute, thrust may be reduced further if desired.
   - When EPR computation is accomplished by the navigator, he will be notified as to whether anti-ice is on or off to ensure proper EPR setting.

4. Air Conditioning – 7.45 PSI (P/CP)

   Prior to 10,000 feet, select 7.45 PSI. Valves in the bleed air temperature control system have a tendency to stick when the environmental control system (ECS) is first turned on after takeoff causing the bleed air overheat light to come on. Should this occur, monitor the manifold temperature gage. If the temperature reaches the red line, throttle back engines 3 and 4 to approximately 0.04 EPR below the highest EPR of remaining engines until the bleed air overheat light goes out. At this time the bleed air temperature should have returned to normal operating range. Advance throttles back to desired setting.

5. Slipway Doors – Open, then closed (P/CP)

   CAUTION

   Slipway doors will not be opened above 300 KIAS.

6. Radar Altimeter – OFF (P-CP)

AFTER TAKEOFF – CLIMB CHECKLIST (Cont)

7. 12,000 Foot Oxygen Check – Completed (EW-RN-P/CP)

   During the climb, the pilots request an oxygen check at 12,000 feet. All crewmembers will check their oxygen panel for proper operation and visually check other crewmembers for alertness. The EW officer, radar navigator, and pilot/copilot will report "Oxygen panels checked". In addition, pilot/copi- lot reports "Cabin altitude _____ feet".

8. Fuel Panel – Set (CP); Checked (P)

   See Section I for proper sequence and check switches 9, 10, 11, and 12 CLOSED.

9. Altimeter – Set 29.92 (P-CP-N)

   WARNING

   - If altimeter indications fail to move during climbs or descents while in the reset mode, the altimeter should be placed in the standby mode.
   - When the altimeter is operating in standby mode, the altimeter correction card for the current aircraft configuration will be used to fly corrected altitude for traffic separation.

10. Level-Off Station Check – Completed (P-CP)

    a. Landing, Taxi & Crosswind Landing Light Switches – OFF

    b. Oxygen & Station Checks – Complete as given in PREPARATION FOR FLIGHT checklist

    c. Thrust Gate – 85°

    d. Starter Switches – After engines have stabilized at cruise altitude, turn starter switches OFF except during instrument flight conditions or turbulence. See Section VII.

    e. EVS Panel Stabilization – VECTOR

11. CG/FLAS – Initialized

    a. PWR Switch – ON

    b. Initialization – Accomplished

       (1) Operating weight loaded.

       (2) Operating weight cg loaded.

       (3) Weapons loaded (select NONE, NUC, or CONV as applicable).

       (4) Flares & chaff loaded (as required)

    c. Mode – Selected

       Select FUEL, WPN, or WT mode as appropriate to monitor aircraft flight condition.

CLIMB

If climbs are made at less than normal rated thrust, a loss of range will result because of the excessive time spent in climbing. MRT may be used for emergency conditions or as mission requirements dictate. Referring to figure 2-9, it should be noted that point A will be reached at approximately the same time regardless of whether military rated thrust or normal rated thrust is used for the climb. Approximately 575 pounds less fuel will be required when military rated thrust is used, but engine life probably will be shortened slightly since higher engine speeds and higher temperatures will be encountered.

Climb Flight Paths

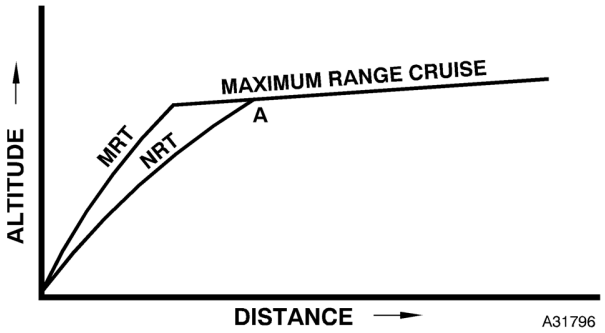


Figure 2-9

NOTE

If the aircraft was serviced with aviation gasoline in any tanks, see RATE OF CLIMB LIMITATIONS WITH EMERGENCY FUEL (AVIATION GASOLINE), Section V.

CLIMB DATA

A study of the climb charts, will show that a constant airspeed is maintained during climb until the proper constant climb Mach number is reached. The loss of one engine during a climb will decrease the aircraft rate of climb.

ICING DURING CLIMB

If icing conditions are suspected to exist within the climb flight path, the engine and nacelle anti-icing system should be turned on prior to the time icing conditions are encountered.

CRUISE

NOTE

With the engines stabilized at cruise flight condition, the copilot should monitor the oil temperature of each engine at convenient intervals and observe any temperatures above 120°C or any significant temperature variations between engines. Note temperatures above 135°C on Form 781.

INSTRUMENT CRUISE

The aircraft has satisfactory handling characteristics throughout the design airspeed and altitude range.

NOTE

The rotating anticollision lights should be turned off during actual instrument flight conditions whenever the pilot can notice the rotating light reflections in the cockpit. A pilot may experience vertigo from these reflections. In addition, the lights will be ineffective during such instrument flight conditions.

RANGE

Normally, a combat mission will be flown using procedures which will produce maximum range. The performance of a jet aircraft is such that maximum range is attained by flying at one particular Mach number and gradually increasing altitude as aircraft weight is decreased through fuel consumption. Such a climbing flight path is accomplished by setting the throttles so as to provide a given engine pressure ratio (EPR) for a corresponding cruise Mach number and checking the altitude frequently to make certain it agrees with that specified by the altitude curve. The rate of climb required is very small (averaging from 16 to 20 feet per minute or about 1000 to 1200 feet per hour). Therefore, rather than attempt to fly at some specified rate of climb, check the flight altitude with that given in the altitude curve at frequent intervals (not to exceed 30 minutes) to assure that the proper climbing flight path is being maintained. Adjust charted EPR as necessary to maintain airspeed and altitude for aircraft gross weight. The autopilot altitude hold position may be used until the airspeed increases, at which time a shallow climb should be initiated to place the aircraft at the correct altitude for the decreased weight. This step climb procedure will be repeated as necessary. The cruise True Mach number should be checked frequently by means of the airspeed indicator. The Machmeter may be inaccurate, causing a range loss of several percent. There is only one weight-altitude schedule which will result in maximum range. The remaining curves on these charts are called the best range for the particular flight condition and result in slightly less range than that attained by flying maximum range. Best range (constant altitude) cruise is usually used for a noncombat mission because the difference in range between this type of cruise and maximum cruise is not great if the altitude is above 35,000 feet. Also, see FUEL MANAGEMENT FOR LATERAL TRIM AND WING FUEL UNBALANCE, this section.

NOTE

Cruise at airspeeds in excess of best range or maximum range airspeeds are detrimental to engine life and should be avoided except when mission requirements dictate.

FUEL MANAGEMENT FOR LATERAL TRIM AND WING FUEL UNBALANCE

When all engines are developing the same thrust and there is no lateral unbalance due to fuel load, small amounts of lateral and rudder trim are required to maintain “hands off ” in level flight. Normally a correctly rigged aircraft meeting the above requirements will need no more than 1 unit of rudder and 2° of spoiler deflection. In the event that maximum range is desired, it should be considered that some degradation of range (in the order of 1% per degree of spoiler deflection) will result from the displaced spoiler. Maximum range and/or endurance may be obtained by using fuel from the heavy wing in such a way that a differential fuel loading will exist between main tanks 1 and 4 sufficient to attain minimum lateral trim. To maintain desired main tank fuel balance during cruise conditions, the following procedures may be used during the main tank to engine sequence.

1. Check auxiliary tank fuel flow control switches (13, 14, 15, and 16) closed.
2. Open crossfeed valve switches as required to feed the low tank engines from the high tank.
3. Shut off boost pump switches in the low tank. (Boost pumps should not be shut off in more than one main tank at any time.)
4. When the desired main tank balance is attained, turn on all main tank boost pump switches prior to closing the crossfeed valves.

NOTE

- In order to achieve a maximum range and/or endurance with this procedure, the spoilers will be down when the aircraft is in the “trimmed out” condition.
- To achieve a spoiler down position, return the lateral trim system to the indicated zero position and the control wheel to the spoiler down position as determined during preflight check.
- Approximately 1000 pounds of differential fuel is required to compensate for 1 unit of trim under cruise conditions.
- The fuel load configuration established is only an indicated differential and may actually be correcting an unbalanced condition which has been caused by fuel gage error.

(Continued)

- Fuel weight differential between main wing tanks 1 and 4 is limited to the following maximums:
  - Above 450,000 pounds gross – 2000 pounds
  - 400,000 to 450,000 pounds gross – 5000 pounds
  - Below 400,000 pounds gross – 20,000 pounds
- Under normal conditions, minimum lateral trim should be obtained with a fuel differential between main wing tanks 1 and 4 as follows:
  - 400,000 pounds gross and above – 2000 pounds maximum
  - Below 400,000 pounds gross – 4000 pounds maximum
- If minimum lateral trim cannot be achieved within the normal condition limits, an abnormal condition exists which requires maintenance action.

CENTER OF GRAVITY

Control of the center of gravity of this aircraft during any cruise operation is simple if the fuel sequence recommended in Section I is followed. As fuel is consumed, the cg location will shift slightly, and a running check should be maintained so that the approximate cg location is known at all times. The stabilizer trim wheel may be used to make such a check by refer- ring to the chart. For maximum range cruise operation at the chart Mach number, the stabilizer trim indicator should be in the vicinity of zero units. If the stabilizer setting is within the limits of 1 unit noseup and 1 unit nose- down, the cg could be expected to be within normal limits. If the stabilizer trim is set outside of these limits, the cg location should be checked against the stabilizer trim char, and compared to calculations based on fuel distribution. Since knowledge of the amount and location of fuel aboard is necessary for flight safety, special care should be taken to detect fuel gage errors. See FUEL SERVICING, this section. To aid in detecting gage errors, a close cross-check should be maintained between planned fuel consumption and gage readings.

WARNING

Loss of an engine or engines, use of any unusual combination of engines, or any fuel usage problems will require close attention to fuel panel settings to assure lateral balance and desirable cg location are maintained. It is essential that any required deviation from the aircraft configuration fuel sequence be planned to maintain the proper differential/balance between paired main/auxiliary tanks. This will preclude an adverse effect on cg location.

NOTE

- The normal limits of 1 unit noseup and 1 unit nosedown for the stabilizer trim set- ting are valid only for maximum range cruise operation (maximum range altitude and chart Mach number) and then for gross weights of 410,000 pounds or less. At gross weights above 410,000 pounds, 1 unit of noseup trim would indicate that the aircraft is out of the forward cg flight limit.
- The normal fuel usage sequences are designed to assure maximum aircraft service life. Precluding wing flutter is a prime factor in the development and use of the prescribed fuel usage sequences as well as wing structural life, lateral balance, and cg location. All of these factors are interrelated. Therefore, use of other than normal fuel sequences to correct a lateral balance or cg problem may impose wing flutter airspeed limitations as defined in figure 5-5.
- If engine shutdown or other emergency precludes the proper fuel sequence steps, compute the center of gravity for the landing condition.

ENDURANCE

Maximum endurance is frequently desired during operational missions when it becomes necessary to hold over a checkpoint, rendezvous with a tanker, accomplish a navigational check, or provide time to correct aircraft functional difficulties. Maximum endurance can be attained only if the recommended airspeeds are observed within ±10 knots, by operating the engines, and by maintaining zero lateral trim. See FUEL MANAGEMENT FOR LATERAL TRIM,
under CLIMB, this section.

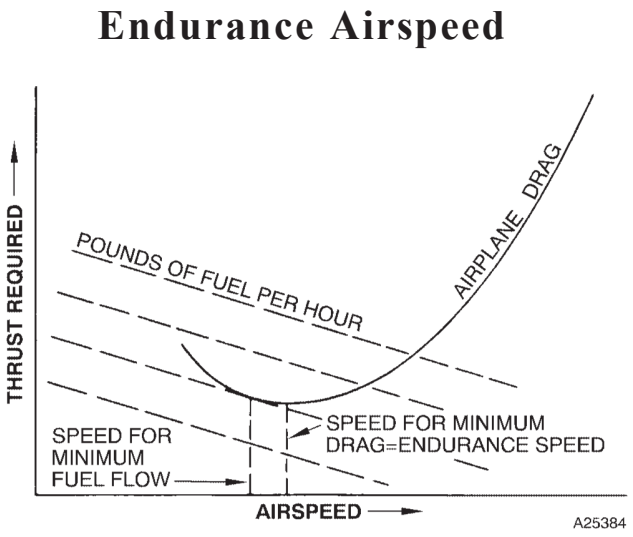


Figure 2-10

Endurance Procedures

Maximum endurance is accomplished by flying at a gradually decreasing airspeed and gradually increasing altitude as the gross weight is decreased through fuel consumption. If the endurance operation lasts less than 4 hours, the gain in endurance by flying a climbing flight path is negligible and constant altitude operation is recommended. The optimum endurance airspeed for any weight and altitude is the airspeed at which the pounds of fuel per hour is at a minimum. This is slightly less than the airspeed at which the aircraft drag is at a mini- mum (figure 2-10). The recommended endurance speed schedule is at the minimum drag point. This results in a negligible penalty in fuel flow while the increased speed is desirable from a piloting standpoint. Shutting down some engines at certain altitudes and airspeeds will result in the remaining engines operating in a more favorable range of rpm with higher efficiencies.

HOLDING

Enter the holding pattern in accordance with procedures as outlined in current directives. Establish a holding airspeed of 230 knots IAS for all altitudes from 15,000 to 35,000 feet and for all gross weights up to 325,000 pounds. For all gross weights greater than 325,000 pounds, refer to the appropriate fuel mileage chart, with the existing gross weight and altitude for a best endurance indicated airspeed. Maintain the airspeed 10 knots above that given or Mach 0.77, whichever is less, for endurance at the given weight to allow for holding turns.

NOTE

If it is necessary to endure and fuel quantity is low, establish the holding airspeed recommended, for the existing gross weight and altitude. In- crease the airspeed 10 knots or maintain Mach 0.77, whichever is less. Maximum en- durance altitude is recommended.

DESCENT

The following procedures are for all letdowns where there is no range emergency and should be accomplished as follows:

Care should be taken to retrim between each 2 unit increment of airbrake operation.

PENETRATION

1. Maintain cruising altitude until reaching the computed distance from the landing base. This distance will depend upon aircraft altitude and weight at the end of mission.
2. Lower the landing gear (as required) and retard all throttles to the IDLE stops. Observe the gear extension placard limits in Section V.
3. Extend airbrakes to position 4 or as required.
4. Make descent at 240 knots IAS or Mach 0.75, whichever is slower.

ENROUTE

1. Throttles idle, gear up, and airbrake as necessary to provide desired airspeed and rate of descent to comply with ATC requirements for the particular enroute descent.
2. The many variables of an enroute descent will prevent precise calculations of range-time-fuel performance.

TACTICAL

Assuming the descent will start from cruise altitude and airspeed, the initial task is to retard the throttles to idle and establish a nosedown attitude of approximately 10°. Extend airbrakes to position 6 in increments of 2, trimming to approximate zero stick force prior to raising the airbrakes to the next position. Maintain approximately zero stick force by continually trimming the aircraft during descent. Maintain approximately 10° nosedown attitude and a speed schedule of 0.84 Mach until reaching 305 knots IAS. Maintain 305 knots IAS during the remainder of the descent. Close coordination between the pilot and copilot is required to ensure that a transition is made from indicated Mach to indicated airspeed. Pilot will coordinate with the navigator as to level-off altitude to be used for this maneuver. Initiate level off approximately 1000 feet above the desired level flight altitude by retracting airbrakes from position 6, to position 4, to position 2, and retrimming. Complete airbrake retraction at approximately 500 feet above the desired level flight altitude, retrim, and add power as required.

(Continued)

NOTE

- See ALTITUDE CALL PROCEDURES in Section IV.
- If turbulence is encountered such that the airspeed indicators are hard to read, hold a 10° nosedown attitude until the turbulence has been penetrated. Aircraft attitude should not exceed 12° nosedown.

TYPICAL DESCENTS AND PENETRATIONS

WARNING

The GPS receiver is not certified for instrument procedures. Do not accomplish a TACAN penetration and/or approach with the navigation mode selector in the GPS position.

NOTE

Enroute descents are compatible with the typical penetration procedures except for aircraft configuration, airspeed, rate of descent, and routing to the final approach.

1. A typical penetration is shown in figure 2-12. Prior to starting a penetration, initiate DESCENT checklist.
2. Accomplish a penetration with throttles, airbrakes, and gear as required at 240 knots IAS or 0.75 Mach, whichever is slower.

WARNING

Care should be taken to retrim between each 2-unit increment of airbrake opera- tion.

NOTE

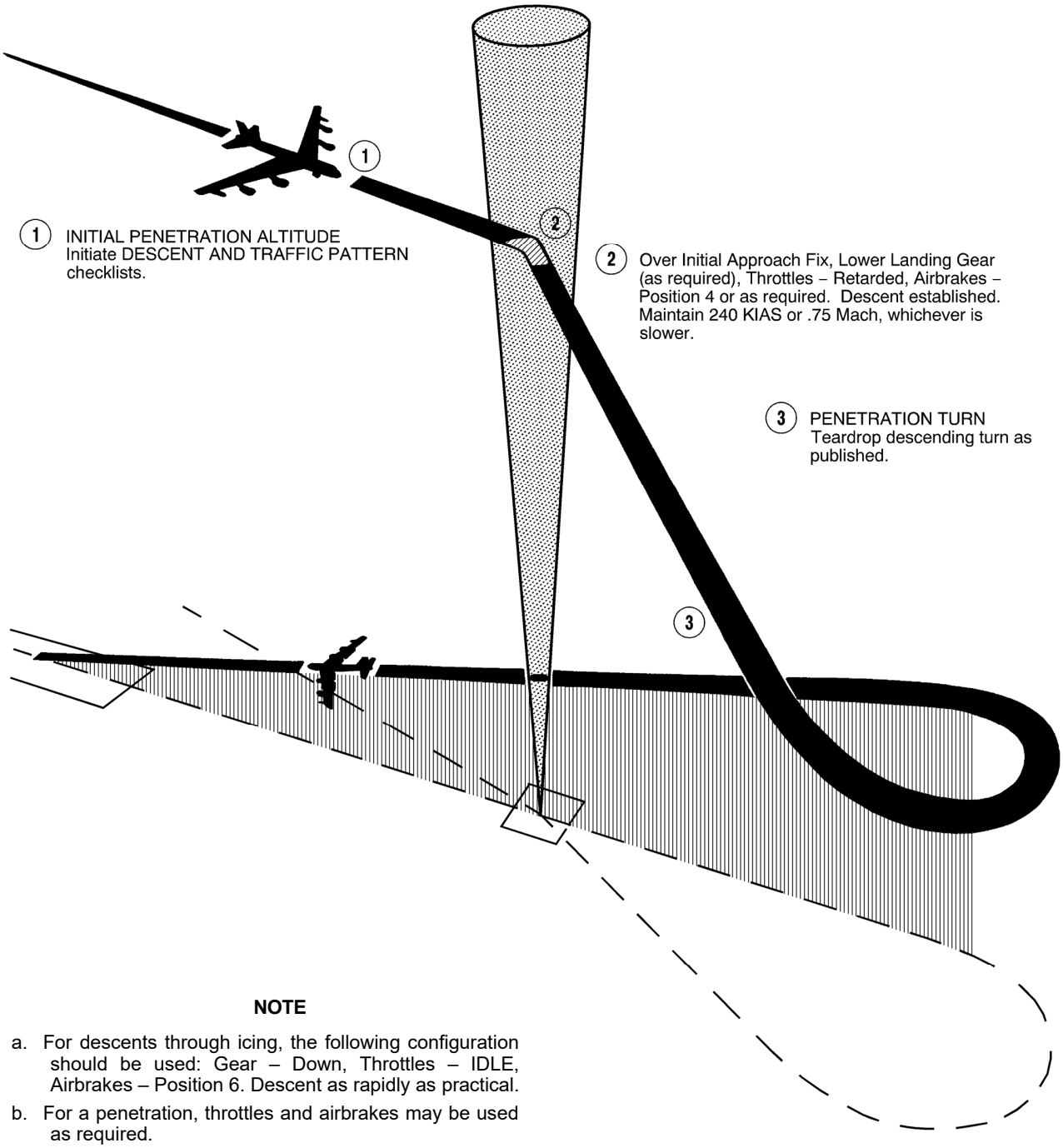
Vary rate of descent by airbrake, throttle, or gear position to satisfy penetration proce dure.-

3. Conform to published procedures.
4. Copilot obtains altimeter setting prior to descent and pilot, copilot, and navigator set altimeters at the prescribed time during descent. The pilot and copilot will cross-check each altitude called by the navigator.
5. Retract airbrakes as required. Allow the air- craft to decelerate to 220 knots IAS. Complete the DESCENT and TRAFFIC PATTERN checklists as required. Establish best flare speed plus 30 knots. Reduce airspeed to best flare plus 10 knots prior to the final approach fix or glide slope interception. (About 20,000 pounds per hour, total fuel flow will be required during descent on final approach.) Maintain best flare plus 10 knots until the flare for landing is started. If visual references at the missed approached point are insufficient to land, execute the missed approach procedure.

Partial Panel Operation

In case of flight instrument failure, especially the attitude indicators and heading indicator, do not use airbrakes during descent and use minimum angles of bank in all turns (1 1/2° per second maximum rate). Make descent under radar control if possible and maintain 0.75 Mach or 240 knots IAS, whichever is slower, but not less than 220 knots IAS. Plan a long straight-in approach, keeping turns to a minimum.

Typical Penetration



NOTE

a. For descents through icing, the following configuration should be used: Gear – Down, Throttles – IDLE, Airbrakes – Position 6. Descent as rapidly as practical.

b. For a penetration, throttles and airbrakes may be used as required.

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Figure 2-12

DESCENT CHECKLIST

CAUTION

If one or more generators are off line, all electronic warfare equipment not required for defense of the aircraft will be turned off prior to de- scent for landing.

NOTE

To conserve fuel, descent should be conducted with minimum use of drag devices (landing gear and airbrakes).

1. Flight Instruments – Checked (P-CP)

   The pilot will compare HSI heading with the standby magnetic heading and OAS inertial heading. Check attitude indicators for proper operation.

2. MFD Display Control Panel MFD EVS Switch – As required (P-CP)

   Setting one pilot's control to the MFD position and the other to the EVS position will allow one pilot to monitor to display MFD screens and the other to monitor to display EVS displays, respectively. If both the Pilot's and Copilot's MFD controls are set to the MFD position, then changing MFD screens on one monitor will change the display on the other monitor as well.

3. EVS – ON, video and stabilization selected (P-CP)

   Depress EVS power switch to ON. Pilot and copilot should both select EVS sensor with best display and vector stabilization.

4. Penetration & Approach – Reviewed (P-CP-RN-N)

   Obtain approach, landing weather, compare forecast versus reported altimeter setting, and review the planned penetration and approach. This review will include navigation aid frequencies, mini- mum and emergency safe altitudes, descent rates, minimums for the approach to be flown, missed approach procedures, and aerodrome sketch. As a minimum the pilot flying the approach will brief the crew on the descent rate, MDA/DH/VDP and missed approach procedures for the planned approach. Lost communications procedures will be coordinated if required. During the descent and approach other crewmembers will back up the pilot flying and report any deviation from prescribed procedures.

   Active Runway _____Wind_____Temp_____
   PA_____RCR _____ Ceiling & Vis
   RVR_____Altimeter_____
   Forecast Altimeter Dest_____
   Alt _____

5. Radar Altimeter – Set (P-CP)

   The pilot flying the aircraft will set his radar altimeter cursor to the HAA/HAT for the approach being flown. The pilot not flying the aircraft will set his radar altimeter cursor to 100 feet above the HAA/HAT for the approach being flown.

6. Landing Data – Computed and checked (CP-N)

   Compute gross weight and best flare speed for planned airbrake position. Adjust best flare speed indicator so that the operating weight plus expendable stores is at the zero point on the total fuel quantity gage. The weight and airspeed value that is adjacent to the needle on the totalizer is the gross weight and the best flare speed for that weight with airbrakes in position 4. As fuel is consumed, the total fuel quantity gage pointer will point to the aircraft gross weight and the corresponding best flare speed for airbrakes in position 4. Check landing data card and recompute required items.

DESCENT CHECKLIST (Cont)

7. Fuel Panel Switches – 1, 2, 3, and 4 ON; 9, 10, 11, and 12 OPEN; 13, 14, 15, and 16 CLOSED (CP); Checked (P)

   Establish a fuel management configuration of main tanks to engines (switches 1, 2, 3, and 4 ON; 9, 10, 11, and 12 OPEN; 13, 14, 15, and 16 CLOSED. For takeoffs, transition, low approaches and landings, open crossfeed valve switches 9, 10, 11 and 12 regardless of the green band. In addition, when any main tank is down to 5000 pounds, open crossfeed valve switches 9, 10, 11 and 12.

   WARNING

   - Failure to accomplish prescribed fuel panel settings with fuel level in main tanks 1 or 4 in green band area or when any main tank is down to 5000 pounds can provide a potential for engine flameout during a critical phase of flight.

   - During all auxiliary fuel transfer operations below 25,000 feet MSL, an explosive condition exists due to the auto-ignition temperature of fuel vapors and the potential ignition source from a malfunctioning auxiliary tank boost pump. Therefore, the auxiliary tanks fuel flow switches will be turned off when the gage reads empty or the no flow indicator light indicates a no flow condition. Auxiliary fuel flow control switches will be turned off whenever fuel transfer is to be stopped.

   CAUTION

   Closure of the main tank switch guard may not actuate the boost pump switch to the ON position. Apply firm pressure to the toggle switch when placing it to the ON position and absolutely ensure it is fully and completely ON before closing the guard.

   NOTE

   If auxiliary fuel usage is desired, it will be transferred directly into main tanks through the main manifold. See WING FLUTTER AIR- SPEED LIMITATIONS, Section V, for speed restrictions associated with use of auxiliary fuel in various aircraft/missile configurations. Auxiliary fuel will be used in order of omitted steps.

8. CG/FLAS – Set (CP)

   Select appropriate mode to monitor fuel weight or sequence, as desired.

9. Lights – ON (P/CP)

   Turn landing, taxi, and crosswind landing lights on for night or day operations unless reflection reduces pilot visibility.

10. Altimeter – Set (P-CP-N)

    Reset altimeters to station pressure immediately prior to initiating penetration or upon passing through transition altitude.

11. Starter Switches – CONT (CP)

12. NAV MODE SELECT Switch – Set as required (P/CP)

    Nav MODE SELECT switch must match the desired mode to ensure proper displays on the HSI CDI.

TRAFFIC PATTERN

Traffic pattern procedures are given in the TRAFFIC PATTERN checklist. Fuel system management procedures during traffic pattern operations are given in the following paragraph.

TRAFFIC PATTERN FUEL MANAGEMENT

For takeoffs, transition, low approaches, and landings open crossfeed valves 9, 10, 11, and 12 regardless of the green band. If auxiliary fuel usage is desired, it will be transferred directly into main tanks 1 and 4 (all main tanks in lieu of step 10) through the main manifold. See WING FLUTTER AIRSPEED LIMITATIONS, section V for speed restrictions associated with use of auxiliary fuel in various aircraft/missile configurations.

TRAFFIC PATTERN CHECKLIST

1. Planned Approach – Reviewed (P-CP-RN-N)

   Check the appropriate navigation aids tuned and identified. If the type of approach or pilot making the approach changes, brief the planned approach. Emphasis will be placed on altitude restrictions, descent rates, instrument MDA/DH/VDP's, and missed approach procedures.

2. Radar Altimeter – Set (P-CP)

   The pilot flying the aircraft will set his radar altimeter cursor to the published instrument HAA/HAT for the approach being flown. The pilot not flying the aircraft will set his radar altimeter cursor to 100 feet above the HAA/HAT for the instrument approach being flown. For visual patterns, the radar altimeter cursor may be set at pilot discretion to any altitude between 200 feet AGL (visual decision point) and 500 feet AGL (minimum altitude for roll-out on a visual final).

3. Flaps – 100%, Lever DOWN (P-CP)

   Allow aircraft to decelerate to 220 knots IAS. At the request of the pilot flying the aircraft, the other pilot will extend flaps. Flap indicators will be monitored to ascertain both flaps are extending simultaneously. The pilot not flying the aircraft will report when the flaps are 50% and when full down. Flaps may be extended during the penetration descent as required.

   CAUTION

   If flaps fail to start moving within 10 seconds, wing flap operation should be discontinued to prevent damage to the flap drive system. See FLAP LIMITATIONS, Section V.

   NOTE

   If a flaps-up landing is required, discontinue use of this checklist and see LANDING WITH WING FLAPS UP checklist, Section III.

4. NAV MODE SELECT Switch – Set in mode other than GPS (P/CP)

   WARNING

   The GPS receiver is not certified for instrument procedures.

5. Fuel Panel Switches – 1, 2, 3, and 4 ON; 9, 10, 11, and 12 OPEN; 13, 14, 15, and 16 CLOSED (CP); Checked (P)

   Establish a fuel management configuration of main tanks to engines (switches 1, 2, 3, and 4 ON; 9, 10, 11 and 12 OPEN; 13, 14, 15 and 16 CLOSED. For takeoffs, transition, low approaches and landings open crossfeed valve switches 9, 10, 11 and 12 regardless of the green band. In addition, when any main tank is down to 5000 pounds, open crossfeed valve switches 9, 10, 11, and 12.

   To maintain balance in main tanks and replenish mains 1 and 4, open the appropriate engine feed control valves 19, 20, 21, or 22. Set the applicable auxiliary fuel control switch to ENGINE FEED and place the master refuel switch ON. The master refuel and auxiliary fuel control switches will be turned OFF prior to any low approach, touch-and-go landing, fullstop landing, or whenever trans- fer is stopped.

   WARNING

   - Failure to accomplish prescribed fuel panel settings with fuel level in main tanks 1 or 4 in green band area or when any main tank is down to 5000 pounds can provide a potential for engine flameout during a critical phase of flight.

   - During low level or traffic pattern fuel panel operations, the master refuel switch will not be used by itself to control auxiliary tank fuel transfer operations. Whenever engine feed is selected with the auxiliary tank fuel flow control switch and the master refuel switch is off, the auxiliary tank boost pumps will continue to run with a no flow condition. Therefore, both the master refuel switch and all auxiliary fuel control switches will be turned off whenever fuel transfer is to be stopped. This is necessary since below 25,000 feet MSL, an explosive condition exists due to the auto-ignition temperature of fuel vapors and the potential ignition source from a malfunctioning auxiliary boost pump.

   - During all auxiliary fuel transfer operations below 25,000 feet MSL, an explosive condition exists due to auto-ignition temperature of fuel vapors and the potential ignition source from a malfunctioning auxiliary tank boost pump. Therefore, the auxiliary tanks fuel flow control switches will be turned off when the gage reads empty or the NO FLOW indicator light indicates a no flow condition. Auxiliary fuel flow control switches will be turned off whenever fuel transfer is to be stopped.

   CAUTION

   Closure of the main tank switch guard may not actuate the boost pump switch to the ON position. Apply firm pressure to the toggle switch when placing it to the ON position and absolutely ensure it is fully and completely ON before closing the guard.

6. Best Flare Speed – Checked (CP-N)

   Copilot reads best flare speed for airbrakes position 4 from best flare speed indicator ring or computes for other airbrake positions and cross-checks airspeed indicator with pilot's indicator. Navigator cross-checks the speed.

TRAFFIC PATTERN CHECKLIST (Cont)

7. Thrust Gate – Set (CP)

   The copilot will recheck the thrust gate setting from figure 2-13 or by advancing throttles 4 and 5 and checking approximately 5000 pph increase in total fuel flow. Readjust thrust gate as necessary.

8. Landing Gear – DOWN (P-CP)

   Copilot checks gear lever in detent. Both pilots check that the gear warning light is out and that all six gear indicate down and locked.

WARNING

If any Normal Gear Control circuit breakers were previously pulled while performing the Main Landing Gear Fails to Retract checklist, ensure those circuit breakers are reset. Failure to reset the Normal Gear Control circuit breakers for the affected gear after landing gear extension for landing could result in a gear retraction and gear up landing.

9. Antiskid Indicator Panel – Checked (CP)

   With the landing gear down and locked, move the test switch to the FLT position. Check that all indicator lights are on. A lit indicator light signifies that the individual brake represented by the light has released and is ready for landing. Failure of any light to illuminate indicates there is no power to the anti-skid shield for that wheel, and anti-skid protection will not be available for that wheel.

CAUTION

With any indicator lights not on, when the gear down and locked and the test switch in FLT, hard braking during landing may cause skid- ding and/or a blown tire on the wheel corresponding to the unlighted indicator.

NOTE

If all eight lights fail to come on, recheck that the antiskid switch is ON.

10. Crosswind Crab – Set, knob down (P-CP)

11. Target Trim – Noted (P/CP)

    When the aircraft is established on final approach in landing configuration (landing gear and flaps down, and airbrakes in planned position) at best flare speed plus 10 knots IAS, the pilot not flying the aircraft will note the stabilizer trim setting for zero stick force. This value will be called out as target trim during an approach with airbrakes in position 0 or 2. For an approach with airbrakes in position 4 or 6, a computed trim value of 2 units in the noseup direction from that noted will be called out as target trim.

NOTE

- If the computed target trim value is not within the range of 1.0 to 3.0, units nosedown, a further check of aircraft center of gravity should be made by reference to the APPROXIMATE CG LOCATION LANDING CONFIGURATION chart

- It is preferable to note stabilizer trim while in straight and level flight. In VFR traffic patterns or situations where it is not readily feasible to establish straight and level on final approach, the stabilizer trim target setting during descent may be used provided the rate of descent does not exceed 1000 feet per minute.

12. Landing Check – Completed (P-CP)

    a. Gear

    b. Flaps

    c. Airbrakes 4 (or as required)

    d. Lights

    e. Fuel

    A check of the above items will be made when established on final.

WARNING

- During low level or traffic pattern fuel panel operations, the master refuel switch will not be used by itself to control auxiliary tank fuel transfer operations. Whenever engine feed is selected with the auxiliary tank fuel flow control switch and the master refuel switch is off, the auxiliary tank boost pumps will continue to run with a no flow condition. Therefore, both the master refuel switch and all auxiliary fuel control switches will be turned off whenever fuel transfer is to be stopped. This is necessary since below 25,000 feet MSL, an explosive condition exists due to the auto-ignition temperature of fuel vapors and the potential ignition source from a malfunctioning auxiliary boost pump.

- During all auxiliary fuel transfer operations below 25,000 feet MSL, an explosive condition exists due to auto-ignition temperature of fuel vapors and the potential ignition source from a malfunctioning auxiliary tank boost pump. Therefore, the auxiliary tanks fuel flow control switches will be turned off when the gage reads empty or the no flow indicator light indicates a no flow condition. Auxiliary fuel flow control switches will be turned off whenever fuel transfer is to be stopped.

Thrust Gate Setting for Go-Around

THRUSTGATE SETTING
FOR GO-AROUND

AIRPLANE: B-52H
ENGINES: TF-33-P-3

DATA BASIS: ESTIMATED

DATE: MARCH 1961

CONDITIONS:

- NO AIRBRAKES
- FLAPS AND GEAR DOWN

REMARKS:

- CHART IS VALID FOR ANY AIRBRAKE POSITION USED PRIOR TO GO-AROUND SINCE AIRBRAKE RETRACTION SHOULD BE NEAR SIMULTANEOUS WITH SETTING GO-AROUND THRUST

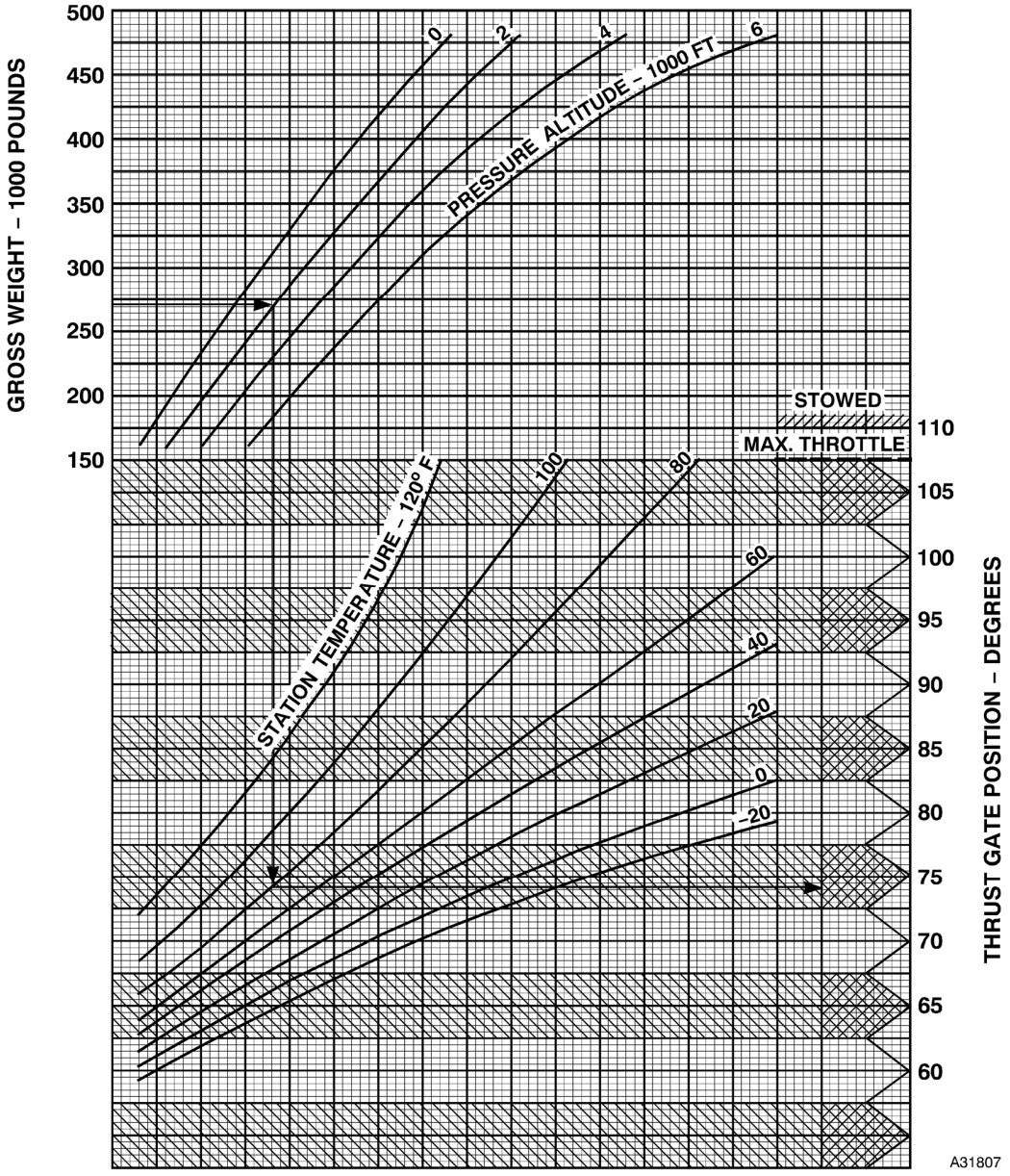


Figure 2-13

APPROACH

Since conditions at airports are continually changing, the landing approach techniques must be varied to meet existing conditions. In general, a normal landing pattern can be used.

INSTRUMENT APPROACHES

For normal approach purposes, the B-52 and all modified versions thereof is considered a Category D aircraft. In those cases where speed for a circling maneuver exceeds 166 knots, Category E minima will be applied.

Radar Approach

Entry into the radar approach pattern (figure 2-14) is normally made with gear down at 220 knots IAS. Complete TRAFFIC PATTERN checklist as outlined in Section II. Adjust power to maintain best flare speed plus 30 knots IAS after the flaps are down. Reduce airspeed to best flare plus 20 knots on base leg. After the turn to final approach and prior to reaching the glide slope, reduce airspeed to best flare plus 10 knots IAS. (About 20,000 pounds per hour, total fuel flow will be required during de- scent on final approach.) Maintain best flare plus 10 knots until the flare for landing is started. When the minimum altitude is reached as indicated by the altimeter or when advised by the controller, whichever occurs first, perform the missed approach procedure if visual references are inadequate for landing.

Instrument Landing System

The following procedures apply to manual approaches.

TRANSITION TO FINAL

Accomplish a normal transition as specified in the FLIP terminal charts. Set the NAV mode select switch to ILS, tune the ILS frequency, set the inbound localizer course in the course selector window, and set the heading selector switch to NOR. Complete the TRAFFIC PATTERN checklist and establish best flare plus 30 knots IAS. When the aircraft is within 90° of the inbound course, decelerate to best flare plus 20 knots IAS and center the bank steering bar. This will initially establish up to a 45° intercept to the localizer. As the aircraft approaches the localizer, the bank steering bar will direct a turn on course. Stabilize the aircraft at best flare plus 10 knots IAS prior to the glide slope interception point.

FINAL APPROACH

When the glide slope indicator reaches center, adjust power to maintain best flare plus 10 knots IAS. Keeping the bank steering bar centered will automatically correct for wind, and keeping the pitch steering bar centered will establish the pitch attitude necessary to correct to or maintain the glide slope. Continue the approach until visual references are sufficient to land or to published minimums, whichever is higher. At this point, commit to land or follow the missed approach procedures.

WARNING

During an ILS final approach using the Flight Director System (ILS APP mode selected) the loss, or reduction in strength, of the glide slope signal will normally cause the glide slope warning flag to appear. Simultaneously with the warning flag appearance, the glide slope indicator and pitch steering bar may remain at or slowly move toward a centered position. Failure to immediately observe the (red) warning flag under conditions requiring high instrument (red) lighting intensities, coupled with the false “on glide slope” indication, could result in misinterpretation by the pilot. During the ILS final approach phase, a frequent cross-check should be made for the glide slope warning flag and/or unduly stabilized glide slope indicator/pitch steering bar combination. A continuous cross-check of altitude and rate of descent should be made as well as monitoring marker beacons, aural signals, and radar altimeters, whenever possible.

Radar Approach (Typical)

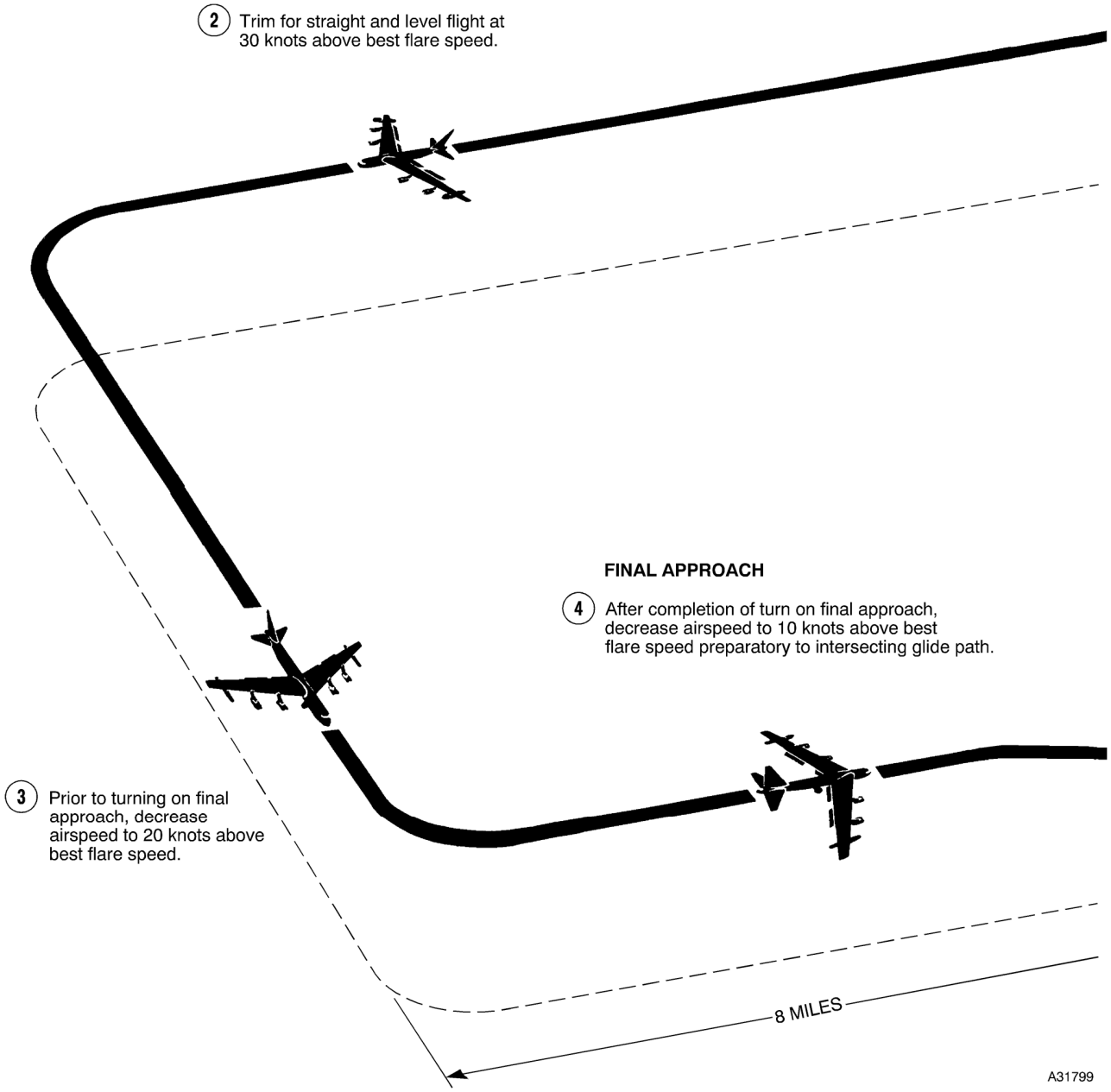


Figure 2-14 (Sheet 1 of 2)

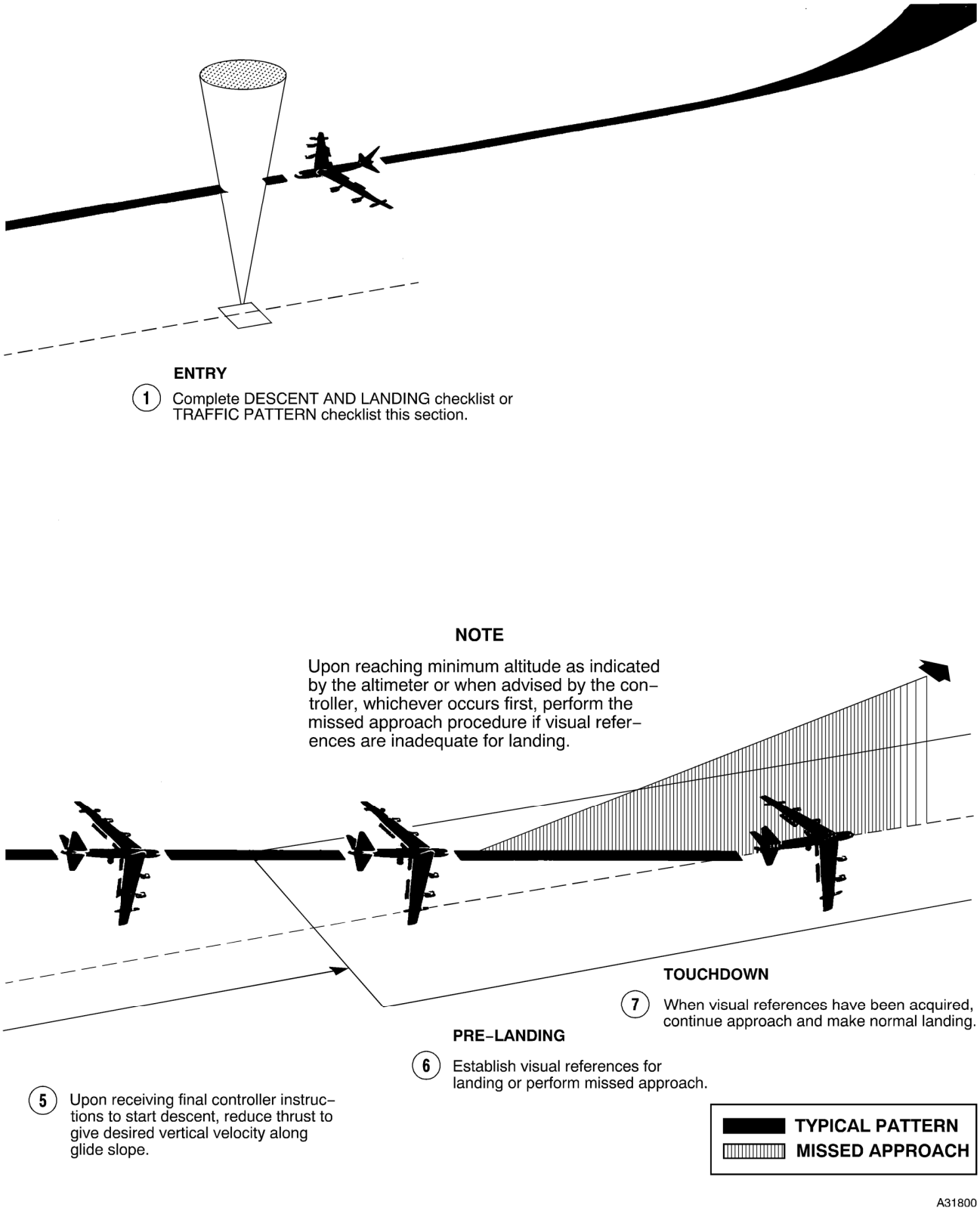
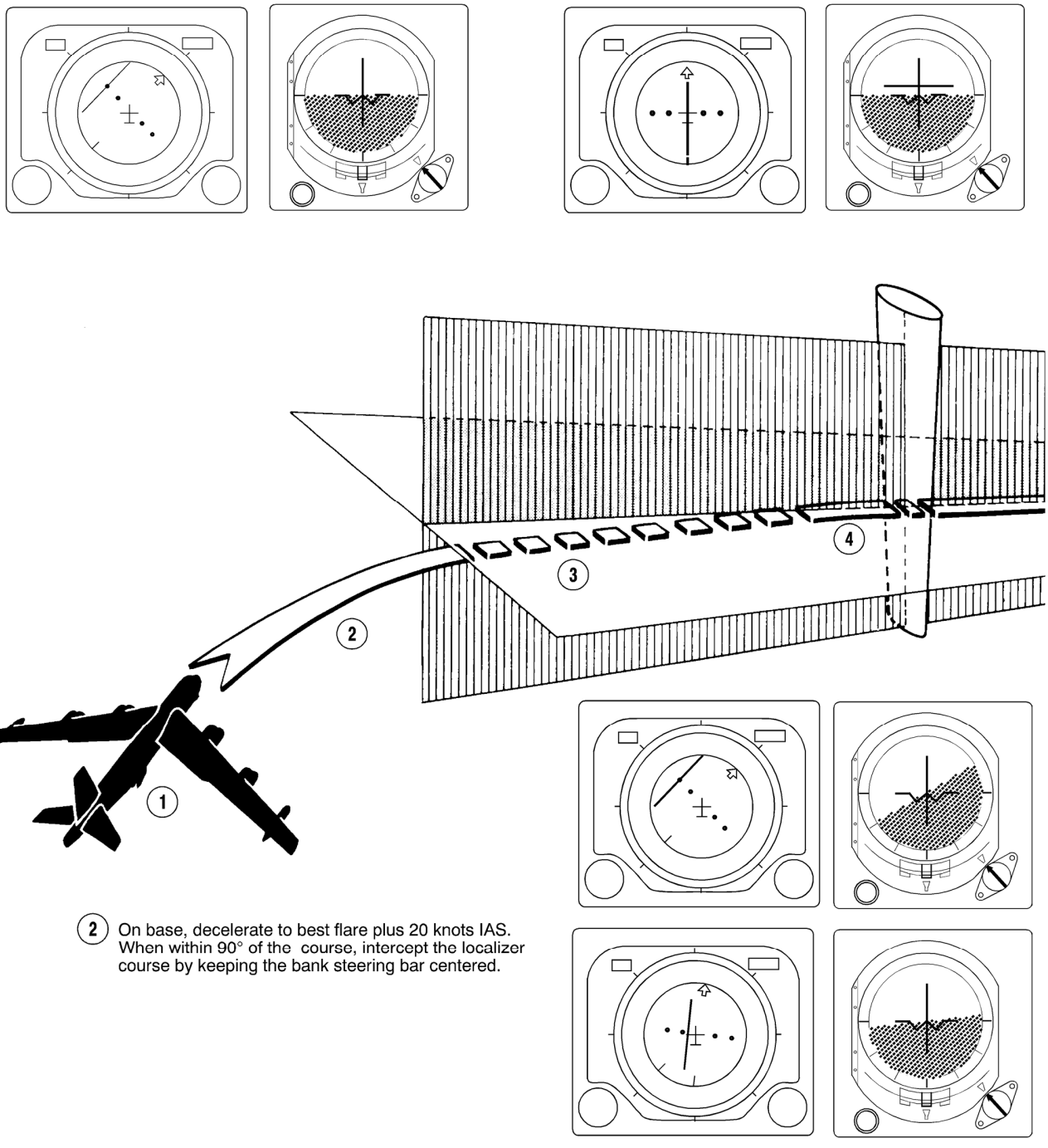


Figure 2-14 (Sheet 2 of 2)

ILS Approach (Typical)

(1) TRANSITION TO FINAL – Tune the ILS frequency, set the nav mode select switch to ILS, set the inboard course, and set the heading selector switch to NOR. Complete the DESCENT AND LANDING checklist or TRAFFIC PATTERN checklist as outlined in this section. Establish best flare plus 30 knots IAS.

(3) On final, when established on localizer course (CDI centered), place the nav mode select switch to to ILS APP. Stabilize aircraft at best flare plus 10 knots IAS.



(2) On base, decelerate to best flare plus 20 knots IAS. When within 90° of the course, intercept the localizer course by keeping the bank steering bar centered.

Figure 2-15 (Sheet 1 of 2)

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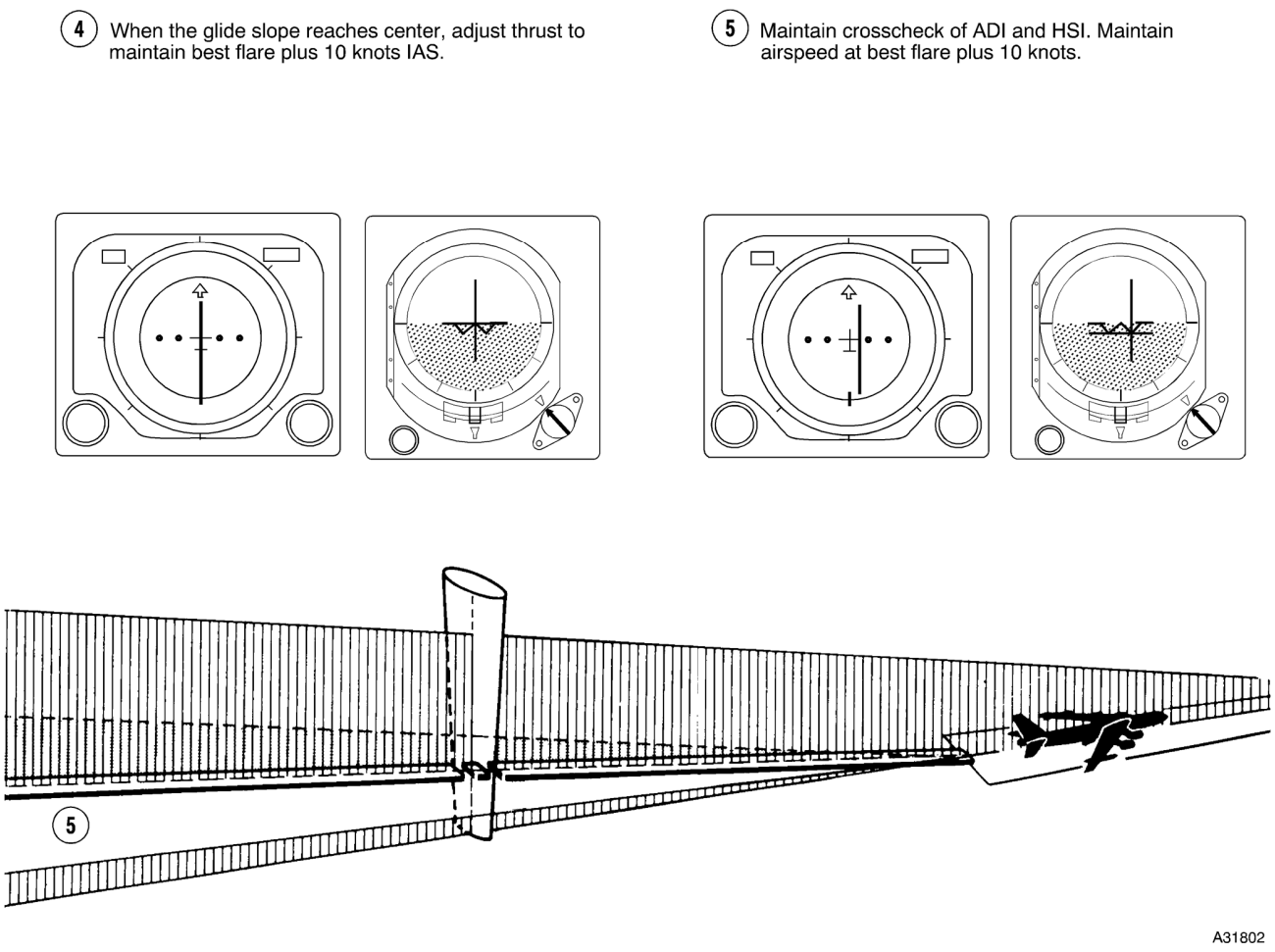

Figure 2-15 (Sheet 2 of 2)

Circling Approach

Generalized procedures for circling approaches are contained in current instrument flight directives. Follow enroute descent or jet penetration procedures; however, reduce airspeed to best flare plus 20 knots prior to the final approach fix. Maintain 20 knots above best flare speed during the circling maneuver until beginning rollout to align with the landing runway. At that time, reduce to best flare speed plus 10 knots until the landing flare point is reached. Bank angle should be limited to 30 degrees throughout the maneuver.

Missed Approach

Missed approaches are accomplished using the same procedures as given for VFR go-arounds. Ad- vance throttles as required, retract airbrakes, establish a positive climb (approximately 1000 feet per minute is appropriate for most missed approaches), trim as required, and check for a positive increase in airspeed. Aircraft acceleration upon executing the missed approach procedure is such that at light weights under instrument conditions flap placard speeds may be rather quickly exceeded.

WARNING

Care should be exercised in applying power at light gross weights due to pitchup developing during acceleration. See GO-AROUND, Section VI, for a detailed discussion of this characteristic.

Retract gear as soon as it is certain that the aircraft will not touch the ground and retract flaps using normal procedures if the published missed approach procedure is to be followed or if proceeding to an alternate airport. During the flap retraction cycle, it is required that the pilot monitor the aircraft attitude indications as closely as possible, keeping the aircraft trimmed to a zero stick force, especially during the last 20% of flap retraction.

NOTE

If a visual approach pattern is to be made, the pilot may, at his discretion, leave the gear and flaps down and maintain airspeeds as specified for a normal radar approach pattern.

APPROACH PROCEDURE (VISUAL PATTERN)

Referring to figure 2-18, the downwind leg is entered at the altitude specified in applicable regulations. The TRAFFIC PATTERN checklist will be completed at this point and the airspeed reduced to 30 knots above computed best flare speed. The turn from the downwind leg will be a descending 90° turn to the base leg with a reduction in airspeed and altitude. Roll out to a wings-level attitude while descending on the base leg for sufficient duration (approximately 10 seconds) to allow for visual clearance of other aircraft in all directions. Maintain 20 knots above computed best flare speed until starting turn to final approach. A 90° descending turn to final approach will then be initiated and, at the completion of rollout on final approach, the airspeed will be 10 knots above computed best flare speed, minimum altitude as specified in applicable directives. A 30° bank will be the maximum allowable in the traffic pattern. The 10 knots above best flare speed will be maintained until the flare point is reached. As the flare point is reached and the aircraft is rotated for landing, the throttles will be retarded so as to cross the end of the landing runway at best flare speed. After touchdown, the airbrakes should be fully extended and the drag chute deployed.

NOTE

- During the approach and landing, the copilot should monitor the altitude and airspeed. Warn the pilot when above or below safe altitude or airspeed, or whenever the angle of bank exceeds recommended values.

- Pitch response of the aircraft becomes more sensitive with aft center of gravity conditions particularly in the landing gross weight range. In lightweight aft cg landings, there may be a tendency to flare high and hold the aircraft off the runway in a higher than normal noseup attitude due to lower stick force characteristics and reduced requirements for stabilizer trim during landing flare.

- The pilot should be alert for the condition of forward throttle creep from IDLE posi- tion throughout approach and landing to preclude unscheduled power resulting from advanced throttle settings.

- If a crosswind leg is flown, the aircraft will be rolled out to a wings-level attitude on the crosswind leg for sufficient duration to permit visual clearance of other aircraft in all directions.

- The pilot's and/or copilot's sliding window may be opened at normal traffic pattern speeds and maneuvers provided all hatches are in place. If a hatch has been released, the opening of a sliding window should be avoided as inward acting airloads may cause the window to blow into the cabin area.

APPROACH CONSIDERATIONS

Heavyweight Landing

It is possible to make landings at any weight up to the maximum gross weight as long as rates of descent at touchdown are limited. (See WEIGHT LIMITATIONS, Section V.) Since most landing experience will have been obtained at gross weights less than 290,000 pounds, landings below this weight will be considered a routine operation. If it becomes necessary to land the aircraft above 290,000 pounds, normal landing techniques may be used up to approximately 325,000 pounds. If it should become necessary to land the aircraft above 325,000 pounds gross weight, the following techniques are recommended:

1. Use airbrake position 1. Approach speed will be 10 knots above the airbrake position 1 best flare speed. The slower approach and flare speed with airbrakes 1 will give less flare distance. The danger of a hard landing will also be less because of the slower deceleration when using airbrakes 1.

2. Intercept the approach path farther out than usual. Maintain a fairly normal approach slope with rates of descent on the order of 500 fpm. Plan to arrive over the end of the runway at the best flare speed at a lower altitude than for a normal landing.

3. Reduce thrust cautiously during the landing flare to ensure that the rate of descent is controlled. The key to a good heavyweight landing is not the attitude but the speed control using thrust after crossing the end of the runway. The aircraft may settle very rapidly if thrust is suddenly reduced.

4. The landing attitude will be considerably more nosedown than for a normal landing because the airbrakes are at 1. For a typical normal weight landing with No. 4 airbrakes the fuselage will be approximately 2° to 3° noseup at the minimum touchdown speed. For a heavyweight landing with airbrakes position 1, the fuselage will be approximately 0° to 1° noseup.

Airbrakes

The airbrakes are operated by a throttle type control located next to the throttle quadrant. The aircraft noses up when airbrakes are extended. Although the trim change can be handled by elevator use, retrimming should be accomplished after each position change. Position 4 should be used for landings at gross weights below 325,000 pounds, and airbrakes position 1 above 325,000 pounds gross weight. When a reduced thrust condition is encountered, airbrake position 2 may be selected instead of position 4 to preclude excessive drag due to airbrakes. Any airbrake position from 0 thru 6 may be used for an approach and landing under unusual conditions. If changes in airbrake position are made on final approach, the change in trim requirements will be observed, particularly between airbrake positions 2 and 4. Airspeeds flown will be based on the actual airbrake position used during final approach. The airspeed versus airbrake position relationship becomes critical at the start flare point due to the change in trim and in airspeed bleed off with various airbrake settings. Therefore, final airbrake selection should be made to allow stabilization at the proper airspeed and trim condition prior to the start flare point. Best flare speed for airbrake position 4 is approximately 10 knots faster than the no airbrake best flare speed and for airbrake position 2 is approximately 5 knots faster than the no air- brake best flare speed. Regardless of airbrake position utilized for approach, a normal glidepath (2.5° to 3.0°) should be established as early as practical on the final approach. The minimum touchdown speed is not changed regardless of the amount of airbrake extension, although there is some change in landing attitude. Using full airbrake extension changes the touchdown attitude to such an extent that at minimum touchdown speed the aircraft will touch down rear gear first with the front gear about one-third of a wheel diameter in the air. Touching down all wheels simultaneously with airbrakes fully extended will add 11% to the minimum touchdown speeds. Stalling speeds are not affected by airbrake position. With practice, airbrakes can be used to a great extent to vary the approach and landing pattern, to steepen the final approach, or to reduce airspeed rapidly.

NOTE

If touchdown is to be made with full airbrakes, maintain higher approach speed to the flare point.

Minimum Speeds

The minimum recommended airspeeds at which the aircraft should be flown in straight flight with flaps either up or down are given in figure 2-17. It will be remembered that in turns the minimum speeds will be increased from those shown. The minimum pattern maneuvering speed for bank angles up to 30 degrees is best flare speed plus 20 knots (approach speed plus 20 knots for flaps up). If required to maneuver in the pattern prior to turn to final, maintain minimum pattern airspeed for aircraft configuration.

Minimum Speeds - Low Altitude

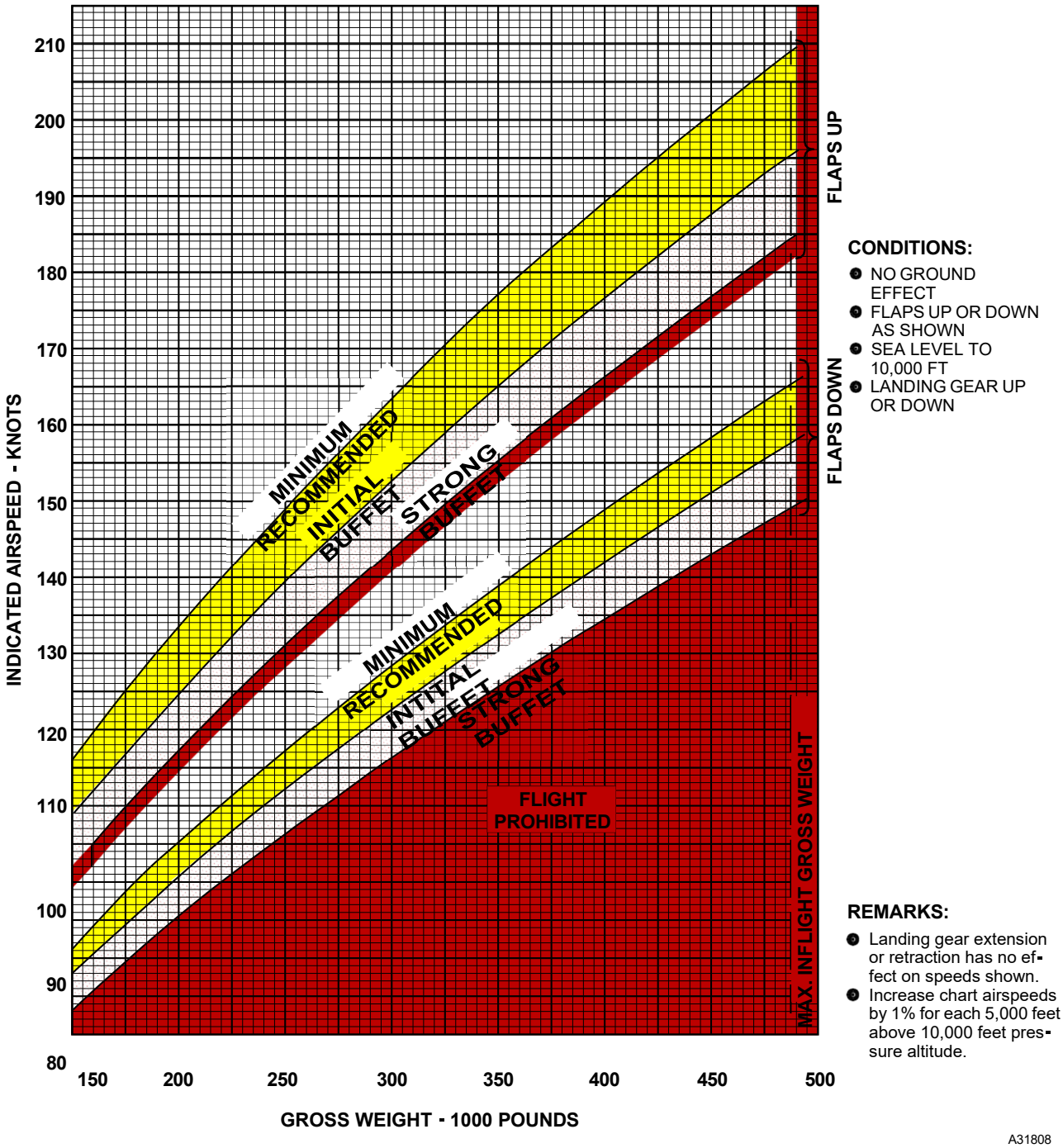

Figure 2-14

Wind Shear

Wind shear is a complex phenomena that can adversely affect the aircraft in all phases of flight, but is most critical during the approach and landing phase. Wind shear can exist as a rapid change in wind velocity and direction as well as vertical air movement. There are many factors which influence or contribute to a wind shear condition. As a general rule, the amount of wind shear is greater ahead of warm fronts, although the most common occurrences follow the passage of cold fronts during periods of gusty surface winds. When a temperature change of 10°F or more is reported across the front, or if the front is moving at 30 knots or more, conditions are excellent for wind shear. In addition, when thunderstorms are present in the area of intended landing or a strong temperature inversion is near the ground, the possibility of encountering wind shear is increased.

1. Wind Shear Effects. The thrust required, vertical velocity, and pitch attitude on final approach, used in conjunction with the wind reported on the ground, provide an indication of potential wind shear. Be alert for:

a. Unusual changes in airspeed and rate of descent followed by corresponding changes in glideslope and pitch attitude.

b. An unusually high or low power setting required to maintain airspeed.

Caution will be exercised in initial reductions of thrust and pitch to avoid a steep glideslope intercept in a low power, high sink condition.

2. Wind Shear Phenomena. The following are two wind shear phenomena that are commonly found during final approach:

a. Decreasing Headwind. Initial reaction of the aircraft when encountering a decreasing headwind (or an increasing tailwind) is a drop in indicated airspeed and a decrease in pitch resulting in a loss of altitude. If the wind shear occurs at low altitude, the pilot will add power and increase pitch to regain the proper glideslope. In severe conditions, higher than normal thrust and higher than normal pitch attitudes may be required to maintain the proper descent profile.

b. Increasing Headwind. The initial aircraft reaction to an increasing headwind (decreasing tailwind) is an increase in indicated airspeed and an increase in pitch resulting in a gain in altitude. The pilot should reduce pitch and power to regain the proper glidepath. Caution will be exercised in initial reductions of thrust and pitch to avoid a steep glide slope intercept in a low power, high sink condition. This could result in the aircraft landing well short of the intended touchdown point.

WARNING

If the aircraft becomes unstable on final approach due to wind shear and the approach profile cannot be promptly reestablished, a go-around should be immediately accomplished.

LANDING

LANDING WITH GUSTY WIND CONDITIONS

It is not necessary to increase the final approach speed for gust velocities up to and including 15 knots. For gust velocities in excess of 15 knots, the final approach speed should be increased two-thirds of the gust velocity in excess of 15 knots. For example, with a wind velocity of 20 knots with gusts to 50 knots, 10 knots would be added to the final approach speed (total gust velocity 30 knots; 30 – 15 = 15 knots; 15 x 2/3 = 10 knots).

TOUCHDOWN

The recommended touchdown is with the rear gear first at minimum touchdown speed. This allows for an adequate flare without a bounce. However, if the forward gear is too high when the rear gear touches, a hard landing may result. Full airbrakes should be applied immediately after touchdown provided there is no bounce. With the antiskid system operative, the wheel brakes may also be ap- plied immediately after touchdown although this decreases brake service life. The runway available will determine when the wheel brakes should be applied. After establishing a stable ground roll, brakes will be checked for proper operation followed by intermittent application of the brakes as re- quired. The normal landing charts show the landing ground roll distances with wheel brakes applied at 90 knots IAS. See MINIMUM RUN LANDING, this section, for more details on use of brakes and drag chute.

NOTE

The front gear is well forward of the cg and if allowed to touch down first, a bounce is almost certain to occur. This usually is the result of too much speed.

CROSSWIND LANDING

Prior to or during the time the aircraft is in the traffic pattern, a decision will be made as to whether or not the crosswind crab system is to be used. After obtaining the wind direction and velocity from the tower located at the field at which the landing is to be made, compute the crab angle for the wind and landing gross weight.

CAUTION

If wheel brakes are applied immediately before and held during touchdown when the main gear is turned more than 14° (by any combination of crosswind crab setting and steering) the aircraft will land with wheels locked because the antiskid system is inoperative in this condition. When the landing gear is turned, the landing gear centering cams compress the landing gear. At more than 14° from center, the landing gear is compressed enough to actuate landing gear safety switches as though the aircraft were actually on the ground. The antiskid system (which is tied into the landing gear safety switches) allows the wheels to be locked when the aircraft is on the ground and not moving. Releasing the brakes will activate the antiskid system.

NOTE

- Sustained runway wind velocity plus one-third of the gust factor will be used to compute crosswind crab settings when landing with gusty wind conditions.
- If a crosswind cannot be compensated for by use of the crosswind crab system, a landing is not recommended.
- If the wind is a variable wind, the average heading of this variable wind should be used.

With Use of Crosswind Crab System

Smooth landings can be made through use of the crosswind crab system even though crosswinds of high velocity are encountered. Such landings also require very little additional effort from the pilot. Touching down the aircraft in a crabbed attitude may seem strange the first few times such landings are tried, but this technique is easily learned by the pilot.

CROSSWIND CRAB SETTING

After voice radio contact has been established with the tower, obtain the runway surface wind and direction. After the landing gear has been extended, turn the crosswind crab control knob until the miniature aircraft and pointer on the indicator point to the crab angle set- ting determined for the wind and gross weight. Ex- tend the flaps, raise airbrakes to position 4, and control the airspeed in the same manner as for a normal approach. After rolling out onto final ap- proach and after the aircraft is crabbed into the wind to establish a flight path straight down the runway, recheck the position of the miniature air- craft and pointer on the crosswind crab control indicator. The nose of the aircraft, as well as the nose of the miniature aircraft and pointer on the indicator, should always be pointed off the runway into the di- rection of the wind component. Lower the crosswind crab control knob after the crab setting has been es- tablished.

CAUTION

If rudder trim is used on landing, ensure that the crosswind crab control knob is not turned instead of the rudder trim knob since they are located concentrically.

NOTE

The upper and lower pointers on the crosswind crab position indicator may show a difference in heading once crosswind trim is established. This condition is normal and is caused by the fact that only the forward gear are steerable and operate even when set for crosswind conditions. As a result, any rudder pedal deflections will show up as a difference in indication between the two pointers.

LANDING ROLL

After the aircraft is on the runway, more and more lateral control will be required to hold the wings level as the speed decreases. If difficulty is encountered in maintaining track down the runway at low speeds, the control wheel should be centered since an asymmetric spoiler condition will cause an unfavorable turning force. Do not change the crosswind crab setting until the aircraft is ready to turn off the runway. Under slippery runway conditions, the crosswind crab setting will help to maintain steering control. The crosswind crab system is not normally used to steer the aircraft on the ground.

NOTE

- When landing under conditions of high crosswinds, light gross weights, and a slippery runway, loss of steering may result. For further information, see LANDING WITH CROSSWIND ON SLIPPERY RUN- WAYS under ICE AND RAIN, Section VII.

- Be alert for indication of a missetting of crosswind crab at touchdown. Corrections should be accomplished by normal rudder pedal steering. Do not use the crosswind crab control knob for steering except in an emergency. On very smooth landings, a missetting of the crosswind crab will not immediately manifest itself by the aircraft diverging off either side of the runway; the first indication of incorrect setting will be a deceleration force due to tires scuffing.

Without Use of Crosswind Crab System

If the crosswind crab system is not to be used because of a malfunction, the landing may be made by approaching fully crabbed with rudder and lateral controls centered. If desired, a combination of crabbing into the wind and a slight lowering of the upwind wing may be accomplished, but the wing should not be lowered to such an extent that the tip gear touches the ground first upon landing. Touchdown in the crabbed attitude with normal landing rates of descent will not induce detrimentally high side loads on the landing gear since the gear is lightly loaded at this time. By landing rear gear first, the aircraft will tend to pivot about the rear gear and thereby reduce the crab angle by the time the forward gear touches. Full airbrakes should be applied and the drag chute may be deployed at touchdown since forward gear steering will be adequate by the time the drag chute becomes effective.

MINIMUM RUN LANDING

The approach for a minimum run landing should be planned so as to arrive over the end of the runway with the throttles at IDLE and at a speed as close to best flare speed as possible. A minimum run landing is accomplished by having the brake anti- skid system operative, deploying the drag chute, using full airbrakes after touchdown, applying wheel brakes immediately after touchdown, and continuing to apply brakes throughout the landing roll. The drag chute provides considerable deceleration force over the first portion of the landing roll while the wheel brakes have a small decelerating effect because the wheels are lightly loaded. As the aircraft decelerates, the drag chute becomes less effective while the brakes become more effective.

CAUTION

All landings should be planned from a landing distance standpoint as though the drag chute were not installed. The chute should be considered only an aid to braking and a means of reducing tire and brake wear.

WHEEL BRAKE APPLICATION

Each wheel is equipped with a complete brake antiskid assembly, eight units per aircraft. Therefore, when one wheel approaches a skid and the brake pressure is released by the skid detector, no other wheel brake assembly is affected. Regardless of this desired feature, however, the wings should be held as near level as possible during the landing roll so that all wheels are on the ground. If the wings are not level, the high tire on each landing gear becomes lightly loaded causing a loss in braking effectiveness because of the limited braking torque on the heavily loaded wheels. Maximum braking effectiveness with antiskid operative is obtained by depressing the rudder pedals fairly hard and letting the individual brakes cycle as required to prevent skids. Application of a fairly hard force on the brake pedals will result in the heavily loaded wheels being cycled at a slower and more desirable rate, while the lightly loaded wheels are cycled quite rap- idly. This cycling can be felt by the pilot and be- comes quite noticeable, especially if several of the gears cycle on and off at approximately the same time. If several of the gears do start to cycle in unison and cause a violent vibration, the pedals should be released momentarily and then reapplied. The difference between conventional braking and use of antiskid is that with antiskid operating, the brakes can be applied earlier in the landing roll and maximum braking can be maintained throughout the entire roll without excessive tire wear due to skids. On slippery surfaces at low taxi speeds, wheel deceleration is very fast when brakes are applied and skid signals are generated more frequently, releasing brake pressure before a locked wheel occurs. Aircraft deceleration is not felt by the pilots because of the fast cycling of the antiskid system. However, the use of antiskid under these conditions is the recommended procedure since attempting to brake without it results in greater stopping distances.

DRAG CHUTE DEPLOYMENT

Normally, the drag chute will be deployed on all landings. The drag chute should be deployed only after touchdown. The time required for the drag chute to open is about 4 seconds after the drag chute lever is pulled to DEPLOY position. It is not recommended that the drag chute be deployed during the flare while the aircraft is floating since there is a tendency for the aircraft to pitch up or down, depending on the speed, and to drop in due to rapid deceleration. See Section V for drag chute limitations.

CAUTION

- Dragging the chute along the runway causes considerable wear on the chute suspension lines and canopy. If possible, keep engine thrust high enough at the lower ground run speeds to hold the chute off the ground until the aircraft can be turned off the runway. Request the ground crew to stand by to retrieve the chute as soon as the aircraft is clear of the runway and the chute is jettisoned.

- During prevailing surface winds of 15 knots or greater, do not turn more than 90° away from the wind while drag chute is deployed.

NIGHT LANDING

The procedures and techniques used for a night landing are the same as those used for a normal day landing. In addition, the terrain clearance light may be used at the pilot's discretion.

OBSTACLE CLEARANCE LANDING

If a relatively high altitude must be maintained to clear some obstacle located within the traffic pattern, a steeper approach must be made after clearing the obstacle. A normal approach with full flaps and airbrake lever in position 4 is made with sufficient altitude to clear the obstacle. If a steeper approach is desired, airbrakes position 6 may be used. Should the obstacle be located close to the end of the runway, it may be necessary to place the airbrake lever in position 6 and steepen the approach before passing over the obstacle. In this case, the pilot should approach at a sufficiently high altitude to assure clearance with the steeper approach. If full airbrakes are used, the rate of descent will be higher than normal and the flare will have to be started earlier.

NOTE

If touchdown is to be made with full airbrakes, maintain higher approach speed to the flare point.

LANDING CHECKLIST

Accomplish After Touchdown (need not be read):

1. Airbrakes – Six (P)
2. Drag Chute – DEPLOY (CP)

   Drag chute will be deployed on pilot's command. In the event a go-around is not anticipated and the drag chute does not deploy, do not jettison the drag chute. This will permit the cause of the malfunction to be determined during the POSTFLIGHT INSPECTION. See Section V for drag chute limitations.

3. Brakes – Checked (P)

   After establishing a stable ground roll and checking hydraulic system pressure, check brakes for operation followed by intermittent application of brakes as required.

4. Hydraulic System – Checked (P)

   Check all hydraulic lights off.

5. Crosswind Crab – Centered (P)
6. Steering Ratio – TAXI (P)

CAUTION

Center the rudder pedals before repositioning the steering ratio selector lever. Actuation of the lever when the rudder pedals are deflected could result in a dangerously abrupt change in steering angle.

GO-AROUND

The decision to make a go-around should be made as early as possible since engine acceleration time is a factor and approach speeds are relatively close to touchdown speeds. Normally, this decision can be made prior to touchdown. As soon as it has been decided to go around, advance throttles to "go-around thrust" which is the thrust required to arrest descent and produce a satisfactory rate of climb and/ or acceleration, retract airbrakes, trim as required, and, after it is certain that the aircraft will not touch the ground, retract the landing gear.

Further thrust refinements will be accomplished as necessary to obtain the desired performance during the go-around.

WARNING

- In cases where a go-around is initiated just prior to or during the landing flare and where adequate runway is remaining, it may be necessary to maintain a touchdown attitude, contact the runway, then retrim the aircraft during the ground run before initiating power application for a go-around.

- The thrust produced by the turbofan engines demands the use of proper procedure and pilot technique when executing touch-and-go or go-around maneuvers. If MRT is applied for touch-and-go or go-around below approximately 340,000 pounds, the aircraft will respond very rapidly. Immediate nosedown trim will be required as a result of 1) any increase in airspeed, 2) the aft cg shift due to fuel movement to the rear of the tanks in the case of partially full tanks, and 1) the noseup tendency produced by the engine thrust line being below the cg. The adverse effect on aircraft trim is much more pronounced at light gross weights. At light gross weights, nosedown trim must be applied simultaneously with any large increase in thrust to maintain positive control of the aircraft. Conversely, any large decrease in thrust may be critical. If the aircraft has been allowed to rotate to an extreme nosehigh attitude and is no longer accelerating at MRT, any attempt to control the pitch by thrust reduction at this time will result in a stall. If the pitch attitude has progressed to this point, the last resort for possible recovery is to maintain MRT for the pushover and start retrimming as the airspeed begins to increase. It must be noted that MRT is achieved short of full throttle and it is possible to obtain excessive overthrust if throttles are advanced full forward.

- The decision to go-around or land on the remaining runway must remain with the pilot based upon all factors involved. However, if a situation is allowed to develop, which in the pilot's judgment requires a go-around from a low airspeed/low altitude condition, the pilot must be extremely aware of the hazards of aircraft pitchup and the items affecting pitch control. An unscheduled go-around with a mistrim condition can occur where several other trim items occur simultaneously due to fuel shift, thrust, airbrakes, and ground effect. Each item can be controlled by the use of elevator alone. But when several of these items are combined, the elevator, which is the primary flight control system, may not have sufficient authority, and additional authority must be obtained from the stabilizer or airbrakes. A 20 degree pitch attitude and strong buffet can easily occur in 3 seconds from which a recovery may not be possible.

The use of MRT for go-around or touch-and-go without simultaneous application of nosedown trim will be critical. MRT will not be required except at heavy gross weights; therefore, the applicable checklists call for initial application of "target thrust" or "go-around thrust" rather than MRT. Target thrust is obtained by setting throttles against the preset thrust gate. Another method of establishing target thrust is to set the throttles for a total fuel flow equal to the downwind fuel flow plus approximately 20,000 pph (flaps – down, gear – up, and airbrake lever – OFF). The thrust gate is used to assist the pilot in not exceeding the "tar- get thrust" level by feel rather than by visual attention to engine instruments at a time when he must be rigorously cognizant of aircraft attitude and air- speed and rate of change of aircraft attitude and airspeed. The thrust may be subsequently refined by retarding the throttles or by pushing the thrust gate ahead with additional force on the throttles as required to safely accomplish the go-around or touch-and-go. The thrust gate is preset during the downwind leg portion of the landing pattern and will be preset for "go-around" for all go-arounds and landings. See GO-AROUND AND TOUCH-AND-GO LANDINGS, Section VI, for additional discussion.

For pilot comfort and ease in flying, the thrust should be adjusted during climb to flap retraction altitude to a setting which will produce a rate of climb of approximately 1000 feet per minute. If thrust is reduced during this initial climb, it may be necessary to add thrust during flap retraction to maintain the desired speed schedule and to pre- clude loss of altitude. When aircraft reaches 1000 feet and 180 knots IAS, the flaps may be retracted. However, if a positive vertical velocity of 1000 feet per minute is not attained when reaching 1000 feet above the terrain, flap retraction will be delayed until an altitude of 1500 feet above the terrain is reached. During the flap retraction cycle, it is re- quired that the pilot monitor his aircraft attitude as closely as possible keeping the aircraft trimmed to a zero stick force especially during the last 20% of flap retraction. (See figure 2-18 for a go-around pat- tern.)

WARNING

- A go-around should not be attempted if the drag chute has been deployed since it is pos- sible that the drag chute may not jettison. Sufficient thrust is available from eight en- gines to fly the aircraft with the drag chute deployed at weights below approximately 300,000 pounds; however, this is not recom- mended since the associated control prob- lems have not been flight tested.

NOTE

When go-around is accomplished during closed traffic pattern work, the pilot may, at his discretion, leave the landing gear and flaps down.

GO-AROUND CHECKLIST

NOTE

If a go-around is required under low altitude/low airspeed conditions, pilots may not have sufficient time to refer to the checklist. Therefore this checklist should be accomplished as necessary and need not be read. When a safe altitude and airspeed is attained, the pilots will re- view the checklist and complete required items.

1. Go-Around Thrust – Applied (P)

   The pilot will advance the throttles as required to arrest descent and produce a satisfactory rate of climb and/or acceleration. Further thrust refinement will be accomplished as necessary to obtain desired performance during the go-around. The throttle position should not exceed the thrust gate initially. The copilot monitors the engine instruments and notifies the pilot of any abnormal engine operating characteristics.

WARNING

- If the throttles are advanced beyond the thrust gate position for any reason, extreme care should be exercised due to noseup rotation during acceleration.

- If a go-around is initiated after starting landing flare, immediately counter the resultant pitching moment with nosedown elevator. Throttles will not be advanced beyond the thrust gate position without simultaneously resetting the stabilizer toward target trim. Failure to retrim during the thrust application phase of a go-around can result in pitchup, which combined with other pitch trim items, will exceed nosedown elevator authority. Also, with asymmetrical thrust, thrust must not be applied faster than any generated roll-yaw problem can be controlled.

2. Airbrakes – OFF (P)

   Pilot retracts airbrakes, levels off, and checks for a positive increase of airspeed.

3. Landing Gear – UP (as required) (P-CP)

   On pilot's command, copilot retracts the gear when it is established that aircraft will not contact the runway.

4. Thrust – Reduced (P)

   Pilot accelerates to desired IAS (best flare speed plus 30 knots IAS or 180 knots IAS) and adjusts thrust to establish a rate of climb of approximately 1000 fpm.

NOTE

- If the flaps are raised to accomplish flaps-up training, or if the pilots' intentions are to remain in the aircraft traffic area/terminal control area, accelerate to approach speed plus 30 knots IAS.

- Accomplish AFTER TAKEOFF – CLIMB checklist or TRAFFIC PAT- TERN checklist, as applicable.

Landing and Go-Around Patterns

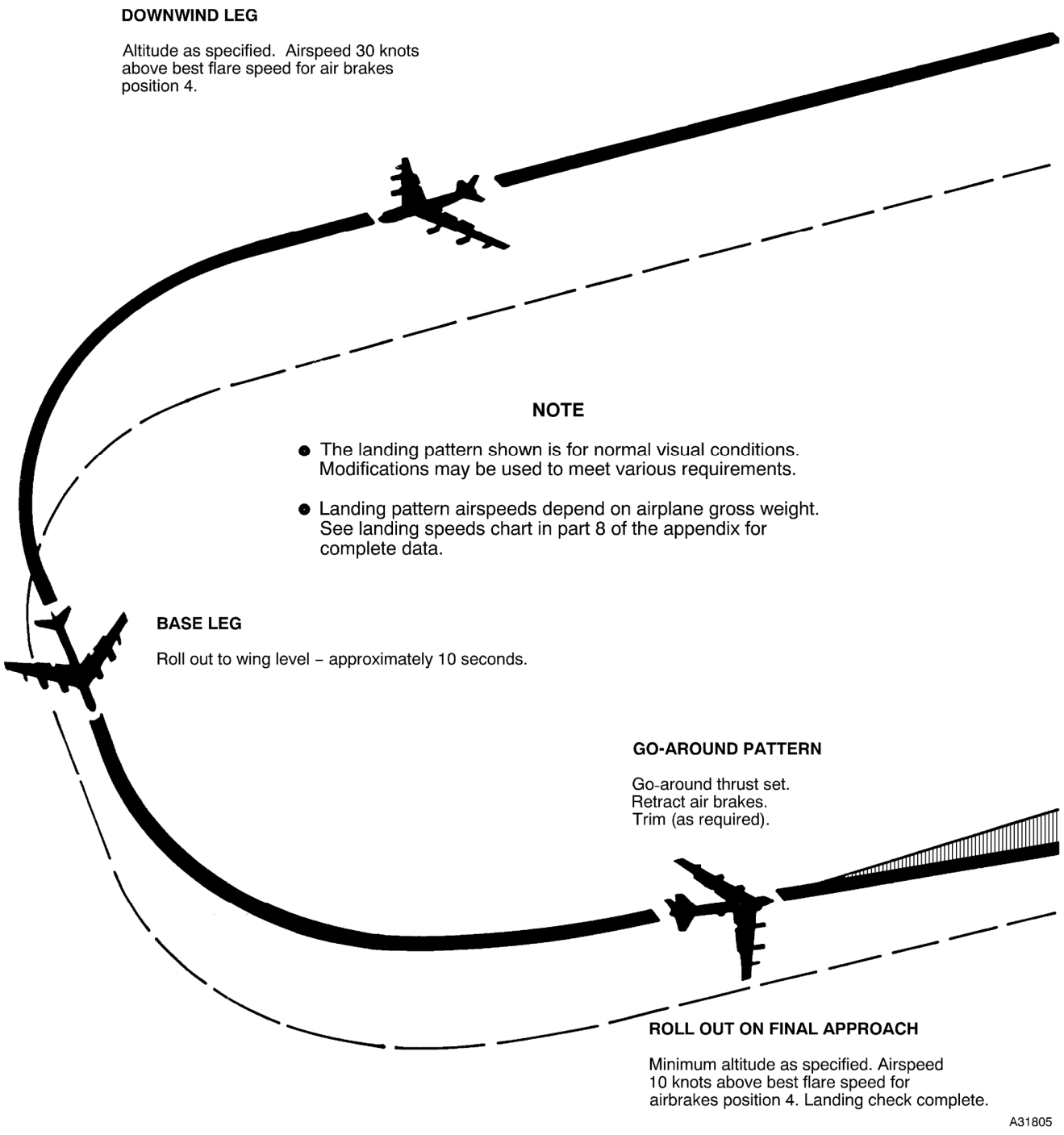

Figure 2-18 (Sheet 1 of 2)

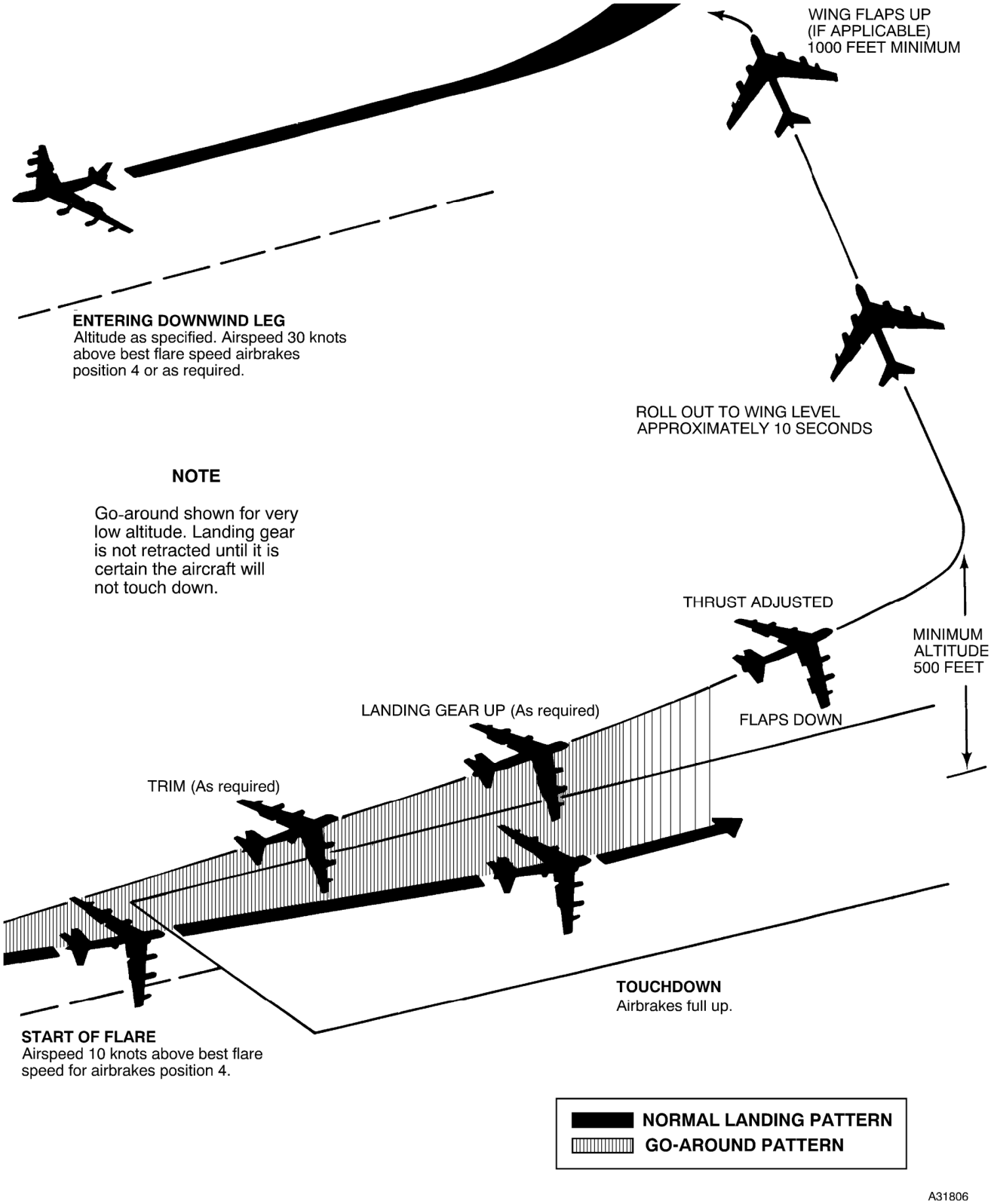

Figure 2-18 (Sheet 2 of 2)

TOUCH-AND-GO LANDING

Failure to lower the airbrakes to OFF and/or retrim to target trim value will result in an excessive nose up rotation immediately following unstick. Any time these abnormal pitching tendencies are encountered, stabilizer trim and forward column should be used to counteract the nose up condition.

The large amount of thrust available from the turbofan engines makes the use of partial thrust procedures for touch-and-go of the utmost importance to preclude a possible hazard due to the rapid acceleration. The thrust gate is used to provide a satisfactory partial thrust level for touch-and-go landings. See GO-AROUND, this section, for a comprehensive discussion of this procedure. Rapid pitch changes must be countered immediately by continuous use of stabilizer trim in addition to control column movement.

Touch-and-go landings can normally be performed within the specified limits while utilizing procedures contained in the amplified TOUCH-AND-GO checklist. Major commands may further impose restrictions on touch-and-go landings.

During touch-and-go landings, after the stabilizer trim has been reset to target trim value, the airbrakes positioned to OFF and power is applied to accelerate to unstick speed, the aft gear may rise off the runway prior to the forward gear and before reaching unstick speed. The resultant nose low attitude coupled with bank angles of approximately 8 degrees or more can result in the outboard engine pods striking the runway surface causing damage to the aircraft and possible loss of control.

WARNING

To preclude premature liftoff of the aft gear during touch-and-go landings, positive back column pressure must be maintained as power is applied to accelerate to unstick speed.

NOTE

See TRAFFIC PATTERN FUEL MANAGEMENT, this section.

TOUCH-AND-GO LANDING CHECKLIST

NOTE

- While touch-and-go landings may be accomplished successfully under conditions more extreme than those listed below, in the interest of flying safety, they will not be performed when:
  1. Gross weight exceeds 290,000 pounds.
  2. Crosswind crab control setting requirement is more than 8°.
  3. Any spoiler is inoperative.
  4. Any hydraulic system is inoperative due to loss of normal system pressure or when a hydraulic standby pump is known to be inoperative.
  5. Any time stab trim cannot be electrically set.

- Landing gear will remain down a minimum interval of 15 minutes air time prior to a touch-and-go landing after a taxi-back landing.

- Continuous ignition will be used during touch-and-go landings by turning the engine starter switches to the CONT position.

- This checklist will be reviewed prior to touch-and-go landings and need not be read while on the runway.

1. Airbrakes – Six (P)

2. Stabilizer Trim – Reset (P/CP)

   Pilot not flying the aircraft will position the stabilizer trim to target trim value noted and notify the other pilot that the trim has been reset.

WARNING

If the stabilizer trim is not reset prior to takeoff, the excessive amount of noseup trim will cause a noseup rotation after takeoff. Any pitch attitude changes following a takeoff will be countered immediately by continuous use of the stabilizer trim in addition to control column movement.

NOTE

- The operation of the stabilizer trim mechanism during the ground roll of touch-and-go landings is considered to be an inflight procedure and inflight operation limitations will apply.

- If too much aft column pressure is utilized on touch-and-go landings prior to the resetting of target trim, possible force switch actuation would interrupt stabilizer trim setting.

3. Airbrakes – OFF (P)

   It is essential that the airbrake lever be returned to OFF before executing the takeoff following a touch-and-go to preclude an unexpected pitchup following takeoff.

TOUCH-AND-GO LANDING CHECKLIST (Cont)

4. Throttles – Advance (P/CP)

WARNING

To preclude premature liftoff of the aft gear on touch-and-go landings, positive back column pressure must be maintained as power is applied to accelerate to unstick speed.

The pilot performing the takeoff after a touch-and-go landing will advance the throttles slowly to an intermediate setting allowing engines to accelerate and stabilize prior to advancing the throttles to the thrust gate. Do not advance throttles until the pilot resetting the stabilizer trim has verbally verified that the trim has been reset. The pilot occupying the other seat will monitor the engine instruments and notify the pilot making the takeoff of any abnormal engine acceleration characteristics. Further thrust refinement will be accomplished as necessary to obtain the desired performance during takeoff and climb. See GO-AROUND, this section, for thrust effects. Premature liftoff prior to unstick speed (minimum touchdown speed) can be hazardous since there is only a 7 to 12 knot margin between unstick speed and initial stall speed. Premature liftoff can only occur when stabilizer is mistrimmed and/or excessive back column is introduced prior to unstick. However, to maintain the aft gear on the runway as the aircraft accelerates, a positive back pressure will be required. Accelerate to best flare speed plus 30 knots IAS on climbout.

NOTE

Accomplish AFTER TAKEOFF – CLIMB checklist or TRAFFIC PATTERN checklist, as applicable.

TAXI-BACK LANDING

Full stop taxi-back landings may be accomplished under the following limitations:

1. Airplane gross weight will not exceed 270,000 pounds.
2. Touchdown will be accomplished in the first one-third of the existing runway to include the sterile portion of the approach end.
3. Planned landing ground run will not exceed 50% of the available runway exclusive of the sterile portion of the approach end.
4. After establishing a stable ground roll, brakes will be checked for operation followed by intermittent application of brakes, as required.
5. A minimum interval of 15 minutes air time will be established between landings or prior to retracting the gear to provide wheel and brake cooling.
6. If the first taxi-back landing accomplished is:

   a. Above 250,000 pounds, a maximum of one full stop taxi-back landing may be accomplished on each sortie, followed by a final full stop landing utilizing the drag chute.

   b. At or below 250,000 pounds, a maximum of four full stop taxi-back landings may be accomplished on one sortie. The fourth landing may be followed by a final full stop landing utilizing drag chute.

TAXI-BACK LANDING CHECKLIST (Copilot reads)

NOTE

- Taxi-back landings or engine-running crew changes may be accomplished using the following checklist. Upon completion of required crew changes the checklist will resume with step 14.
- Circled items will be accomplished whenever a change in crew position(s) is made.
- Asterisked items will be accomplished when selected engines are shutdown.

1. IFF – STBY (P)
2. Drag Chute – JETTISON (if applicable) (CP)
3. Brakes – Set (P)
4. Wheel Chocks – In place (GC)
5. Sliding Window – Open (P/CP)
6. Arming Lever Safety Pins (No. 1) – INSTALLED (P-CP-EW-G)
7. Ejection Control Trigger Ring – Stowed, pin No. 1 installed (RN-N)
8. Stabilizer Trim – Target trim set (P-CP)

NOTE

- During ground operation of stabilizer trim mechanism, advance engines 4 and 5 to 82% rpm.
- Target trim will be the trim used as target trim for the last approach.

*9. Starter Switches – OFF and PNEUMATIC (CP)

TAXI-BACK LANDING CHECKLIST (Copilot reads) (Cont)

10. Generators 1 & 7 – OFF (CP)
11. Throttles 1, 2, 6, 7 & 8 – 75% then CLOSED (P-CP)

NOTE

Allow the engines which are to be shut down to idle for 2 minutes.

12. Brakes – Released (P)
13. Crew Change – Completed, as required
14. Drag Chute Lever – Checked and LOCKED (CP)
15. Ground, Close Entry Door – Roger (GC)
16. Manifold Valve – OPEN (CP)
17. Brakes – Set (P)
18. Standby to Start Engines – Fire guard posted and clear (GC)

NOTE

Engines will be started individually.

19. Start Engines – Started (CP)

    Allow the engines that are being restarted to idle for 2 minutes prior to advancing throttles out of the idle position.

20. Engine Start Switches – CONT (CP)
21. Starter Caution Light – Off (CP)
22. Navigator, Lock Entry Door – Locked (N); light off (P)
23. Manifold Valve – CLOSE (CP)
24. Generators 1 & 7 – ON (CP)
25. Ground, Clear Aircraft for Taxi – Roger (GC)
26. Hydraulic Pressures – Checked (P)
27. Crew Equipment – On and adjusted (ALL)
28. Ground, Remove Wheel Chocks & Disconnect Interphone – Roger (GC)
29. Radar Altimeter – Set (as required) (P-CP)
30. Control Surface Trim – Set (P-CP)
31. Airbrakes – OFF (P)
32. Flaps – 100%, lever down (P-CP)

TAXI-BACK LANDING CHECKLIST (Copilot reads) (Cont)

33. Fuel Panel Switches – 1, 2, 3, and 4 ON; 9, 10, 11, and 12 OPEN (CP); Checked (P)

CAUTION

Closure of the main tank switch guard may not actuate the boost pump switch to the ON position. Apply firm pressure to the toggle switch when placing it to the ON position and absolutely ensure it is fully and completely ON before closing the guard.

NOTE

See TRAFFIC PATTERN FUEL MANAGEMENT, this section.

34. Windows & Doors – Closed and locked (P-CP)

35. Starter Selector – FLIGHT (CP)

36. Takeoff Data – Reviewed (P, CP, RN, N)

    Review EPR, thrust gate setting, S_1 speed, S_1 time, and S_2 speed. Procedures to be used in the event an emergency occurs during takeoff will be reviewed. Both pilots must have a complete understanding of actions to be taken if an emergency occurs prior to or after S_1 speed.

37. Thrust Gate – Set (CP)

38. Seat, Rudder Pedals & Control Column – Adjusted and checked (P-CP)

39. Arming Lever Safety Pins (No. 1) – Removed (P-CP-EW-G)

40. Ejection Control Trigger Ring – Unstowed (RN-N)

QUICK TURN

Full stop, quick turns may be accomplished under the following limitations:

1. Airplane gross weight will not exceed 290,000 pounds.
2. Touchdowns will be accomplished in the first 3000 feet of existing runway.
3. Planned landing ground run will not exceed runway length minus touchdown distance.
4. After establishing a stable ground roll, brakes will be checked for operation followed by intermittent application of brakes, as required.
5. Full runway length will be used for stopping.

QUICK TURN CHECKLIST (Copilot reads)

NOTE

Quick turn sorties may be accomplished using the following checklists.

CONTINUATION–IN CREW

1. Drag Chute – JETTISON (CP)

   The drag chute will be jettisoned and the control handle returned to LOCKED by the copilot after the aircraft has turned off the runway and prior to being stopped for completion of the AFTER LANDING checklist.

   CAUTION

   To prevent or minimize damage to aircraft structure as the drag chute disconnect link strikes it during the jettison sequence, jettison the chute at the lowest taxi speed that will keep the chute inflated.

2. Arming Lever Safety Pins (No. 1) – Installed (P-CP)
3. Readiness Switch Cover – Closed and latched (P)
4. IFF – ZERO, A, and OFF (P)

   Zeroize the mode 4 and turn the IFF off as soon after landing as possible. This assures removal of the mode 4 code and eliminates signals from taxiing or parked aircraft which would otherwise block the controllers scope and interfere with the control of airborne aircraft.

   NOTE

   If it is desired to retain the mode 4 code, momentarily place the mode 4 code switch to the HOLD position. Electrical power will be left on the aircraft a minimum of 15 seconds to lock the code in.

5. Launcher Hydraulic Control Switch – OFF (P)
6. Rudder/Elevator Hydraulic Pumps – OFF (P)
7. Flare Set Power – OFF (P)
8. Pitot Heat – OFF (P)
9. Windshield Anti-Ice – OFF (P)

10. Radar Altimeter – OFF (P-CP)
11. Yaw & Pitch SAS – DISENGAGE (P)
12. Airbrakes – OFF (P)
13. Stabilizer Trim – Zero and CUTOUT (P)

NOTE

During ground operation of stabilizer trim mechanism, advance engines 4 and 5 to 82% rpm.

14. Autopilot Master Switch – OFF (P)
15. Starter Switches – OFF and PNEUMATIC (CP)
16. Liaison Radio – OFF (CP)
17. Generators 1 & 7 – OFF (CP)
18. Throttles 1, 2, 7 & 8 – 75% rpm, then CLOSED (P-CP)

Allow the engines that are to be shut down to idle for 2 minutes. While taxiing back to the ramp, advance throttles 1, 2, 7, and 8 to approximately 75% rpm for not less than 15 nor more than 30 seconds before moving to the CLOSED position. This assures complete scavenging of engine oil and prevents overservicing. This procedure also prevents fuel from accumulating underneath the engines after shutdown. No. 6 engine may also be shut down, if necessary, to reduce taxi speed and still maintain sufficient electrical and hydraulic power for the aircraft.

NOTE

If the engine is allowed to idle for more than 27 seconds, the oil sump area fills and the hydraulic reservoir air pressurization lines accumulate condensation and require scavenging again. Moisture in the reservoir air pressurization lines can collect in the relief valves, freeze in cold weather, and prevent valve operation. Failure of the valves to func- tion can cause partial to complete loss of brakes while taxiing for the next mission.

19. Fuel Transfer – As required (CP)
20. Brakes – Set (P)
21. Body Standby Pumps – STBY (CP)
22. EVS Power – OFF (P-CP)
23. Bomb Doors – Closed (P)
24. Manifold Valve – OPEN (CP)
25. Sliding Window – Open (P/CP)

QUICK TURN CHECKLIST (Copilot reads) (Cont)

26. OAS & EVS – Off (RN)

CAUTION

The OAS, radar, and all EVS subsystems must be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.

27. Air Conditioning – OFF (CP)

28. Generators 3 & 5 – OFF (CP)

29. External Power – ON (CP)

30. Wheel Chocks – In place (GC)

31. Throttles – 75% rpm, then CLOSED (P)

Allow the engines to idle for 2 minutes and, prior to shutting down any engine, advance throttles to 75% rpm to accomplish scavenging. Allow engines to scavenge for not less than 15 nor more than 30 seconds while operating at 75% rpm. Move throttle to CLOSED within a few seconds after retard- ing throttle from the 75% setting.

NOTE

If the engine is allowed to idle for more than 27 seconds, the oil sump area fills and the hydraulic reservoir air pressurization lines accumulate condensation and require scavenging again. Moisture in the reservoir air pressurization lines can collect in the relief valves, freeze in cold weather, and prevent valve operation. Failure of the valves to function can cause partial to complete loss of brakes while taxiing for the next mission.

32. Brakes – Released (P)

33. Engine Anti-Ice – OFF (P)

34. Body Standby Pumps – OFF (CP)

External power may remain connected throughout the Quick Turn, unless maintenance requirements dictate otherwise.

CONTINUATION–OUT CREW

1. Parachute Preflight: (P-CP)
   a. Inspection Record:
      (1) Automatic Release Time & Altitude Setting – Checked
   b. Personal Locator Beacon Lanyard – Snapped

      For peacetime operations, the personal locator beacon lanyard will be configured for automatic operation.
   c. Bailout Bottle Pressure & Hose Connector – Checked
   d. Parachute Arming Lanyard Anchor – Installed

WARNING

Ensure that the parachute arming lanyard anchor is securely fastened in the attachment fitting on the seat. Failure to attach the lanyard anchor to the seat will necessitate manual operation after ejection.

   e. Parachute Straps – Adjusted
2. Drag Chute Lever – Checked and LOCKED (CP)
3. Flaps – UP and OFF (CP)
4. Fuel Panel – Set for takeoff (CP); Checked (P)
5. IFF – STBY, codes set (P)
6. IFF – OFF (P)
7. Windshield Anti-Icing and Defog – Normal (P)
8. Body Standby Pumps – STBY (CP)
9. Crew Report Accomplished (P)
10. Accomplish Normal Checklists starting with the “Starting Engines and Before Taxiing checklist”

AFTER LANDING

The after-landing check shall be performed after the aircraft has been turned off the runway. Hard taxi braking or riding the brakes shall be avoided at all times, particularly after a landing or refused takeoff. See WHEEL BRAKE SYSTEM OPERATION, Section I, and BRAKE ENERGY LIMIT CHARTS (figure 5-14), Section V.

AFTER LANDING CHECKLIST (Copilot reads)

1. Drag Chute – JETTISON (CP)

   The drag chute will be jettisoned and the control handle returned to LOCKED by the copilot after the aircraft has turned off the runway and prior to being stopped for completion of the AFTER LANDING checklist.

   CAUTION

   To prevent or minimize damage to aircraft structure as the drag chute disconnect link strikes it during the jettison sequence, jettison the chute at the lowest taxi speed that will keep the chute inflated.

2. Arming Lever Safety Pins (No. 1) & Armrests – Installed and stowed (P-CP)
3. Arming Lever Safety Pins (No. 1) & Armrests – Installed and stowed (EW-G)
4. Ejection Control Trigger Ring & Pin No. 1 – Stowed and installed (RN-N)
5. Readiness Switch Cover – Closed and latched (P)
6. Mach Indicator – OFF (P)
7. IFF – ZERO, A, and OFF (P)

   Zeroize the mode 4 and turn the IFF off as soon after landing as possible. This assures removal of the mode 4 code and eliminates signals from taxiing or parked aircraft which would otherwise block the controllers scope and interfere with the control of airborne aircraft.

   NOTE

   If it is desired to retain the mode 4 code, momentarily place the mode 4 code switch to the HOLD position. Electrical power will be left on the aircraft a minimum of 15 seconds to lock the code in.

8. Launcher Hydraulic Control Switch – OFF (P)
9. Rudder/Elevator Hydraulic Pumps – OFF (P)
10. Flare Set Power – OFF (P)
11. Pitot Heat – OFF (P)
12. Windshield Anti-Ice – OFF (P)

AFTER LANDING CHECKLIST (Copilot reads) (Cont)

13. Radar Altimeter – OFF (P-CP)

14. Yaw & Pitch SAS – DISENGAGE (P)

15. Airbrakes – OFF (P)

16. Stabilizer Trim – Zero and CUTOUT (P)

NOTE

- During ground operation of stabilizer trim mechanism, advance engines 4 and 5 to 82% rpm.

- If snow and icing conditions necessitate leaving the stabilizer leading edge in the up position after parking, it may be set at this time. Procedures and CAUTIONS outlined under COLD WEATHER PROCEDURES, Section VII, will apply.

17. Autopilot Master Switch – OFF (P)

18. Starter Switches – OFF and PNEUMATIC (CP)

19. Liaison Radio – OFF (CP)

20. TACAN & VOR – OFF (CP)

21. CG/FLAS:

    a. Data Erase – Accomplished, if required (CP)

    b. Power Switch – OFF (CP)

22. Generators 1 & 7 – OFF (CP)

23. Throttles 1, 2, 7 & 8 – 75% rpm, then CLOSED (P-CP)

Allow the engines that are to be shut down to idle for 2 minutes. While taxiing back to the ramp, advance throttles 1, 2, 7, and 8 to approximately 75% rpm for not less than 15 nor more than 30 seconds before moving to the CLOSED position. This assures complete scavenging of engine oil and prevents overservicing. This procedure also prevents fuel from accumulating underneath the engines after shutdown. No. 6 engine may also be shut down, if necessary, to reduce taxi speed and still maintain sufficient electrical and hydraulic power for the aircraft.

NOTE

If the engine is allowed to idle for more than 27 seconds, the oil sump area fills and the hydraulic reservoir air pressurization lines accumulate condensation and require scavenging again. Moisture in the reservoir air pressurization lines can collect in the relief valves, freeze in cold weather, and prevent valve operation. Failure of the valves to function can cause partial to complete loss of brakes while taxiing for the next mission.

AFTER LANDING CHECKLIST (Copilot reads) (Cont)

24. Fuel Panel – Checked (CP)

    Close all fuel valves not required.

25. Sliding Window – Open (P-CP)

    Open sliding window approximately 2 inches to relieve cabin pressure.

26. Bomb Doors – Open (P)

WARNING

If internal weapons were carried the flight crew must visually check bomb bay prior to opening bomb doors.

ENGINE SHUTDOWN

CAUTION

Normally, an engine will be sufficiently cool after landing to permit an immediate shutdown. If an engine has been operating at above 85% rpm for a period exceeding 1 minute after landing, allow the engine to idle at least 5 minutes before shutting down. This will prevent damage resulting from rapid temperature change.

BEFORE LEAVING AIRCRAFT

BEFORE LEAVING AIRCRAFT CHECKLIST (Copilot reads)

1. Brakes – Set (P)
2. Gyro Power – OFF (P)
3. AHRS – OFF (CP)
4. EVS Power – OFF (P-CP)
5. OAS & EVS – Off (RN)

CAUTION

The OAS, radar, and all EVS subsystems must be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.

6. Air Conditioning – OFF (CP)
7. Generators 3 & 5 – OFF (CP)
8. External Power – ON (if available) (CP)

WARNING

External power will not be applied until shackle locking pins, MER/MAU-12 rack lock pins and MER electrical safety pins for each shackle/rack/weapon have been installed. (RN/N perform if qualified personnel not available.)

NOTE

When conventional missiles are on board, standard safeing procedures for the weapon suspension (shackles/racks/electrical safety pins) will be accomplished. When additional safeing procedures unique to that missile must be accomplished, they will be listed in the AFTER PARKING checklist for that missile.

9. Engine Anti-Ice – OFF (P)

10. Throttles – 75% rpm, then CLOSED (P)

    Allow the engines to idle for 2 minutes and, prior to shutting down any engine, advance throttles to 75% rpm to accomplish scavenging. Allow engines to scavenge for not less than 15 nor more than 30 seconds while operating at 75% rpm. Move throttle to CLOSED within a few seconds after retard- ing throttle from the 75% setting.

NOTE

If the engine is allowed to idle for more than 27 seconds, the oil sump area fills and the hydraulic reservoir air pressurization lines accumulate condensation and require scavenging again. Moisture in the reservoir air pressurization lines can collect in the relief valves, freeze in cold weather, and prevent valve operation. Failure of the valves to function can cause partial to complete loss of brakes while taxiing for the next mission.

10A. Anticollision & Navigation Lights – OFF and FLASH (CP)

If anticollision lights create a safety hazard for ground personnel they may be turned off prior to this step.

11. UHF Radios – OFF (CP)

12. V/UHF Radio – OFF (CP)

13. PIHM Assembly – Disconnect (as required) (P-CP)

    a. PIHM Manifold – Disconnect

       Disconnect the manifold from the CRU-60/P bracket located on the parachute harness.

    b. Emergency Oxygen Hose – Disconnect

       Disconnect the emergency oxygen hose from the fitting on the manifold.

    c. Aircraft Oxygen Hose – Disconnect

       While holding breath, disconnect the aircraft oxygen hose from the QD pigtail adapter.

WARNING

Hold breath until steps d. and e. are complete. This will preclude the inhaling of toxic chemicals during the changeover from blower air to the aircraft oxygen system.

d. Blower Hose:

Disconnect blower hose from the ventilation inlet hose on the PIHM manifold, remove from under right armrest and connect the QD on chemical-biological canister.

e. Crossover Valve – Horizontal

Rotate the valve to the horizontal position. Resume breathing.

f. Oxygen Regulator – OFF and 100% OXYGEN

g. PIHM Communication Cord – Disconnect

Disconnect PIHM communication cord from the aircraft communication cord.

h. Intercom Unit – Connect

Connect the intercom unit to the PIHM communication cord.

i. Blower Hose – Reconnect (P)

While holding breath, disconnect blower hose from the QD on the chemical-biological canister, remove from the strap assembly on back of the seat and reconnect blower hose back to the QD on the chemical-biological canister.

j. Blower Electrical Connector – Disconnect

Disconnect the blower from the blower electrical receptacle and replace the receptacle dust cover.

k. Blower – Remove

Remove the blower from the aircraft mounting bracket.

14. Fuel Panel Switches – OFF (CP)

15. Oxygen System – OFF and 100% OXYGEN (P-CP)

a. Oxygen Supply Shutoff Lever – OFF

b. Regulator Diluter Lever – 100% OXYGEN

c. Supply hose disconnect and stowed.

16. Wheel Chocks – In place (GC)

17. Brakes – Released (P)

18. Lights – OFF or as required (P-CP)

19. Battery – OFF (CP)

20. Interphone – OFF (P)

NOTE

The remainder of this checklist will be accomplished silently by the appropriate crewmember.

21. Control Columns – Stowed (P-CP)

22. Seat – DOWN and TILT FWD (external power available) (P-CP)

23. Generator Drive Decoupler Circuit Breaker – OUT (CP)

Pull out the GEN DRIVE DECOUPLE circuit breaker on the ENGINE portion of the right load central circuit breaker panel.

24. GROUND EGRESS Circuit Breakers – Pull (P-CP)

CAUTION

The battery will be depleted if the GROUND EGRESS circuit breakers remain IN for an extended period without aircraft or external power.

25. Brakes – Checked (CP)

The copilot will check for possible cold brakes. He will consider the conditions contained in BRAKE DESIGN under WHEEL BRAKE SYSTEM OPERATION in Section I before writing up a cold brake discrepancy.

26. Applicable Forms – Completed (ALL)

The copilot will assemble the crew to collect completed logs and forms and discuss items pertinent to the mission. The pilot will interrogate each crewmember to determine the proper entries in all applicable forms to facilitate maintenance inspections.

a. Record any limits and/or tolerances that have been exceeded during the mission.

NOTE

All entries shall include to the maximum extent possible, duration, degree, and prevailing conditions for each occurrence.

b. Record the occurrence of any of the following:

(1) Stick forces deemed to be excessively heavy for a given condition.

(2) If, in the pilot's opinion, the aircraft has encountered heavy loads due to turbulence (record highest and lowest accelerometer readings).

(3) Flutter or buffet.

c. Record any unusual or excessive operations, such as:

(1) Failure to obtain charted EPR setting at full throttle, or failure to obtain charted EPR values without exceeding the EGT limits.

(2) Wing flap clutch slippage.

(3) Jettisoning of drag chute or deployment of drag chute over 135 knots IAS.

(4) Long taxi runs at high speed.

(5) Excessive braking during aborted takeoffs.

(6) A live starter cartridge being carried in the starter breech during flight.

(7) Landing or takeoff with wheel shimmy or hard vibrations.

(8) Emergency descent or spoiler buffet being encountered.

(9) Engine failure resulting in seizure or unbalance.

(10) OAS IMU despin on IMU battery.

(11) Flight through lightning.

(12) Hard landings (any landing with sink rate in excess of allowable limits).

(13) Landings at gross weights over 400,000 pounds.

(14) Contact of flaps with the fuselage.

(15) Excessive tail shake and/or abnormal twisting of aft body or empennage.

(16) Excessive dutch roll.

(17) Wheel shudder/brake chatter during taxiing operations (subsequent to initial rollout/brake check).

7.

QUICK REACTION SCRAMBLE CHECKLIST
(Power-Off Configuration – CP/EW reads)

During QUICK REACTION POWER-OFF CONFIGURATION, use the following SCRAMBLE checklist.

NOTE

- Crews will ensure that they accomplish all steps necessary to ensure rapid takeoff capability.
- Takeoff data and stabilizer trim will be updated and reviewed as necessary. They are not included again in the checklist. Flaps should be left in the down position unless climatic conditions or ground equipment (AGE) positioning dictate otherwise. If possible, windows and doors should be kept in the closed and locked position.
- **BOLD FACE** items will be completed before takeoff is initiated.
- Crew equipment should be on or readily available.
- If determined previously to be inappropriate for takeoff or already accomplished, asterisked (*) items should be omitted from this checklist.
- The EW officer may not be available to aid in the checklist completion.

1. **INTERPHONE – ON (P)**
2. **BATTERY – ON (CP)**
3. **BRAKES – SET (P)**
4. **START ENGINES – STARTED (P-CP)**
5. **MANIFOLD VALVE – CLOSED (CP)**
6. **GENERATORS – ON (CP)**
7. **YAW & PITCH SAS – ENGAGE, LIGHTS OFF (P)**

*8. **WINDOWS & DOORS – CLOSED AND LOCKED (P-CP-N)**

9. **GROUND REMOVE WHEEL CHOCKS, CLEAR AIRCRAFT FOR TAXI, DISCONNECT INTERPHONE – ROGER (GC)**

NOTE

Taxiing may be initiated at any time after this item when a visual signal is received indicating all equipment and personnel are clear.

QUICK REACTION SCRAMBLE CHECKLIST (Power-Off Configuration – CP/EW reads) (Cont)

10. ANTICOLLISION & NAV LIGHTS – ON AND STEADY (CP)

***11. FLAPS – DOWN (CP)**

Lower flaps after clear of ground power equipment.

12. ENGINE ANTI-ICING – CLIMATIC (P)

***13. STABILIZER TRIM – SET (P-CP)**

14. STARTER SELECTOR – FLIGHT (CP)

15. TAKEOFF DATA – REVIEWED (P-CP-N)

Review S_1 speed and time.

16. IFF – STBY (P)

17. TAKEOFF – USE NORMAL TAKEOFF PROCEDURES (P-CP)

NOTE

- Pilots will monitor extension of flaps to ensure flaps are 70% extended taking the runway. Copilot will check flap indicator for full extension at the 70 knot call.
- After the aircraft is safely airborne, the STARTING ENGINES AND BEFORE TAXIING, TAXIING, and BEFORE LINEUP checklists should be reviewed and applicable items not previously completed should be performed when time permits.